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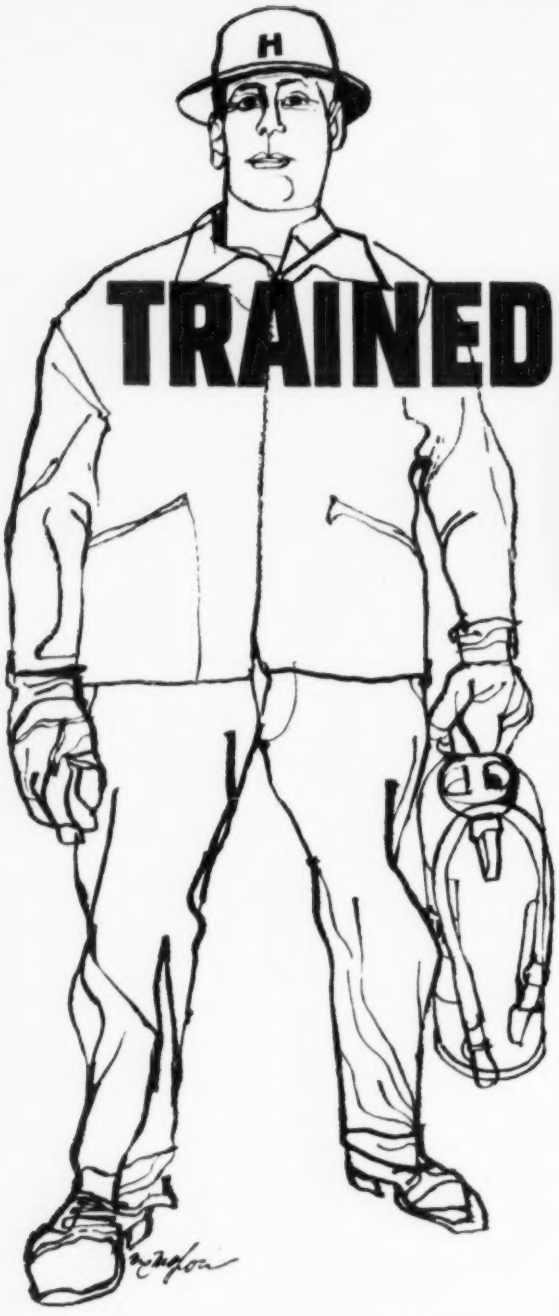
Management Digest

Grace of Casa Grace: What it is like to manage an "international economic accident"—p 22

FOREIGN INVESTORS ON WALL STREET



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▶ WORLD TRENDS

A STABILIZING INFLUENCE?

Consider this when you assess the effects of the U. S. A.'s business recession on the rest of the world:

No question that it is beginning to be felt—mildly. But few observers expect a "chain-reaction" crisis. For one thing, there is a new dimension to the U. S. A.'s business relation with the world:

In 1922-1929, 71% of the world's dollar supply came from U. S. imports. Today, it is a matter of only 50%. The rest comes from military spending ($2,000-million in Europe alone), government aid and loans, private direct investment, tourism, etc. These payments are more stable than imports.

There would have to be a drastic net reduction of imports to make a great deal of difference to world dollar income. Such a reduction is not in sight. Imports seemed to be holding up well as MANAGEMENT DIGEST went to press.

Note that many European trade experts are not attributing the present slow-down in world trade simply to the U. S. recession and the commodity price fall. So far, they see the situation as less an automatic business cycle recession, more a man-made affair, brought on chiefly by the simultaneous attack on inflation in many nations.

DETROIT LOOKS OVERSEAS

One reason U. S. imports are holding up: **Foreign car volume in the American market during January jumped 134% over a year ago.**

This fact is not lost on Detroit. Nor is the fact that exports of U. S. automobiles have been trending down.

The answer, says the American industry, is to build more cars abroad. Right now, all eyes are on the European Common Market and Free Trade Area. That is why General Motors and Ford are expanding in Europe, and why Chrysler wants to join forces with a European maker. The auto men expect a future European auto market as large as that in the U. S. A.

Today, 2-million cars are sold in ECM and the Free Trade Area. By 1965, one Detroit expert sees 2.8-million autos sold in Europe; by 1975, at least 4-million—plus substantial exports. The Americans seem determined to fight for a good share of the business.

And not only in Europe. Detroit forecasts that Brazil's fast-growing auto industry will serve other Latin American nations. And in Asia—Japan, India, Australia—they look for growing local production.

One important Detroit executive says: "Before I retire, I hope to see my company producing as many units abroad as in the U. S. A."

ARAB UNITY—AND DIVISION

Now, the Arabs have a long dreamed of union of Arab-speaking peoples. They have two, in fact, split along the rivalry that has divided the Arabs into two factions: those following the revolutionary leadership of Egypt, and those who favor the cautious, dynastic leadership of Iraq.

At this point, the initiative appears to rest with President Nasser and his United Arab Republic. There are real obstacles to the Egyptian-Syrian

Turn the page for more WORLD TRENDS

federation—lack of common frontiers, economic and ethnic problems.

But there is the powerful sentiment of Arab nationalism behind the union. Furthermore, Nasser's Republic can exert economic pressures against Iraq and Jordan, whose trade—including the all-important oil pipelines—cross Syria. And Jordan is highly unstable, rich only in refugees.

There are moderating influences at work, to be sure. Perhaps the most important is King Saud of Saudi Arabia, whose oil is both piped across Syria and shipped through the Suez Canal.

On the surface, it is an Arab conflict. But Russia and the West are taking sides behind the scenes, and Israel watches with concern.

This continuing conflict in the Middle East makes private investors wary —and the need for capital is a persistent and long-range problem.

One hopeful sign: a new Middle East Development Project, set up by a group of top industrialists and bankers of Europe and the U.S.A., headed by Dr. Paul Rykens, former chief of Unilever N.V. This group has already won the approval of the World Bank, and is currently studying projects.

INDIA: CREDIT AND DEBITS

India is doing better meeting troubles arising out of its Five Year Plan.

By reducing the plan to bare essentials (steel and railroads), New Delhi has also reduced the foreign exchange gap. There is hope now that much of it will be covered by credits from Japan, Canada, Germany, Britain, the U. S. A. and France. Meanwhile, the government is encouraging joint projects between private Indian business and foreigners.

But India has received a blow in the political arena. The "Mundhra Affair"—involving government purchases of some speculative shares—has brought the resignation of the Finance Minister, who has struggled to help the nation through its economic difficulties, and caused a general loss of confidence among government and business people.

But there is this to be said about the scandal. In the words of The Economist of London: "Indian and foreign observers alike have seen a classic example of how the fierce play of the searchlights of a free parliament, a free press, and a free judiciary can reveal what even the most powerful politician or official would prefer to hide."

THE MARCH OF BUSINESS

Japan is going after world markets for wrist watches. Four manufacturers are setting up a joint trading firm, with plans to export—at the start—1-million watches, or about 20% of Japanese production.

More Yankee tourists in South America? American Express Co. sees a trend, developing this year, which will begin to take more Americans on South American holidays. Helping the trend are airline and steamship promotion, and increased tourist salesmanship by South American nations.

Chemical trade has been booming, and the manufacturers are determined to keep it that way. For example: **In Germany,** the "Big Three" Farben successors showed sales gains last year of from 16% (for Bayer) to 20% (for Badische Anilin); their expansion efforts are continuing this year. **In the U. S. A.,** producers such as Monsanto, Dow, Union Carbide, American Cyanamid, Allied Chemical are aggressively courting overseas customers, after strong export sales last year. Note that Cyanamid has organized a new division—Cyanamid International—to direct operations in 80 nations; and Allied Chemical International will begin manufacturing outside the U. S. A. and Canada—via a 50% interest in two Caribbean area producers.

McGRAW-HILL INTERNATIONAL

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Management Digest.

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NEW YORK CITY
APRIL 1958

A Common Market of Management

A MANAGEMENT DIGEST representative, traveling in Mexico, recently heard a subscriber say: "It took me a while to get used to the magazine—but now I really think it is excellent."

This comment puzzled our man for a moment. Then he remembered that MANAGEMENT DIGEST is, after all, a unique publication. There is no international magazine quite like it—circulated by paid subscription only to business executives everywhere in the world outside North America, and edited exclusively for them. It is the only journal we know of that attempts to present, each month, a tour d'horizon of world business trends and techniques, new processes, products, and management methods.

Our purpose is not to entertain, nor is it to tell the specialist about his specialty. Rather it is to provide ideas for the businessman who wants to be well informed on many aspects of business.

If in the course of one year's reading of MANAGEMENT DIGEST a businessman finds one idea that he can adapt, to his own or his organization's greater efficiency and profit, we believe our work has been rewarded, and that his subscription cost has been repaid manyfold. Naturally we hope he gets more than just one useful idea.

The idea is just the beginning. Relating and adapting it is up to the reader. If we can help in the process, directing the reader to further helpful information, he should by all means write to us —while the matter is fresh in his mind.

THAT MANAGEMENT DIGEST readers are good at "relating and adapting" is proved by the many communications we receive here in New York. They deal with all kinds of problems; they come from all over the world—and occasionally from businessmen in the U. S. A. (to whom the magazine is not circulated) who have seen it on an overseas trip.

Yet for all their diversity MANAGEMENT DIGEST readers have a great deal in common. They are proof of the growing community of interest among businessmen—a "common market of management," if you will. The exchange of information, the drive for better management, higher productivity, and economic development—these are ideas understood everywhere.

WHAT kind of men make up this group of readers? Look at a recent batch of renewing and new subscribers to MANAGEMENT DIGEST:

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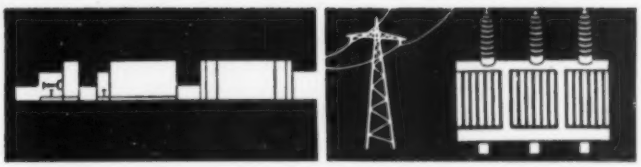
These men, and tens of thousands like them—in small business as well as large—have, like our Mexican subscriber, gotten "used to" this magazine. They are a genuine "common market" of management. Which simply proves once again that ideas know no boundaries.

Paul R. Miller, Jr

75 years AEG



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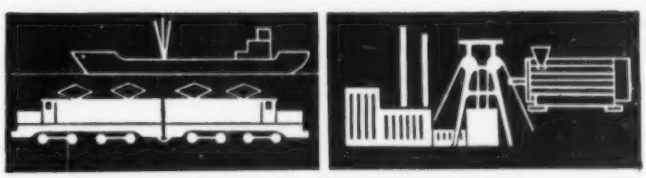

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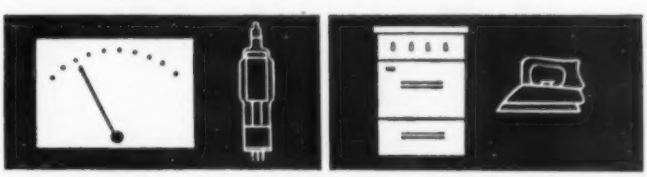

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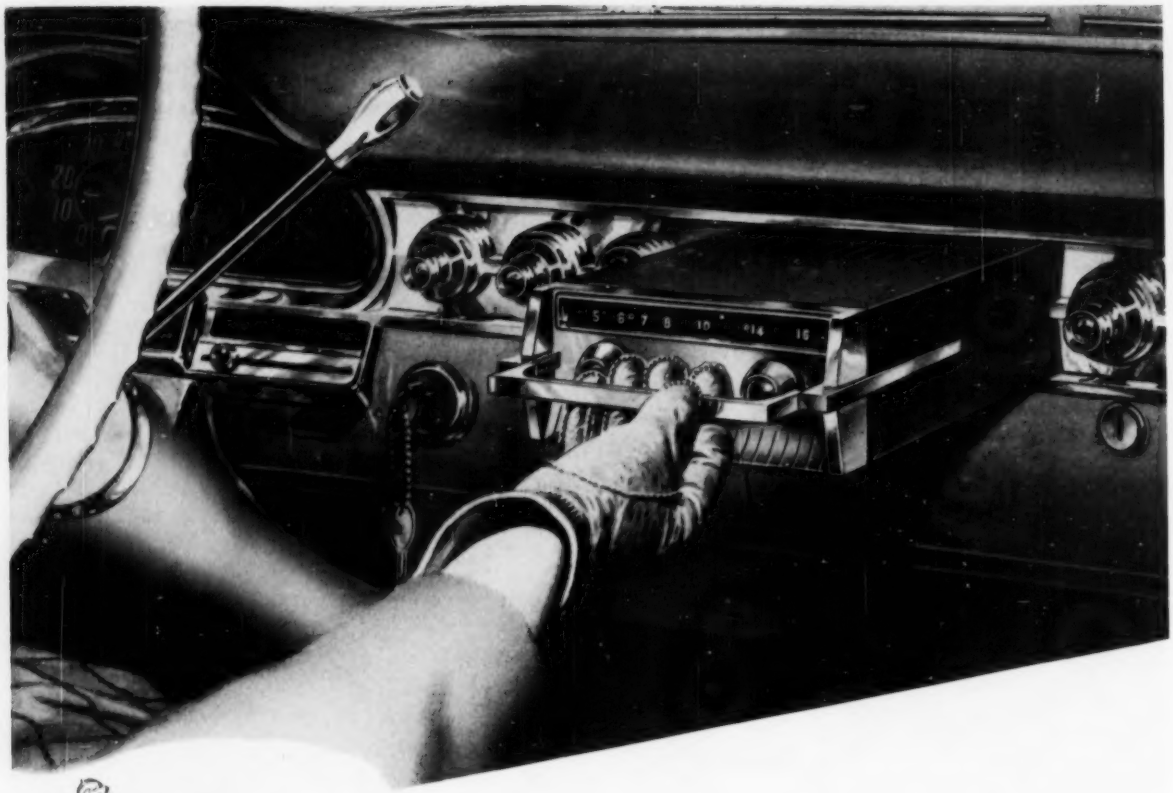

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End of the German "Miracle"?

- Germany's economic advance is slowing.
- Export demand is falling, prices are rising.
- But powerful forces for new expansion remain.

IN THE PAST DECADE, the German economy has provided the main thrust in the expansion of industrial Europe. And German exporters have played an ever more dynamic role in world commerce.

This year, there are questions. Will this great expansive drive continue? Or is the "German miracle" a thing of the past?

The last 12 months show warning signs that the West German economy may not go on growing at such a fast pace. Growth of the national product has slowed; profit margins have narrowed, and many businessmen are looking anxiously at their balance sheets.

Germany's industrial "reconstruction" is complete, even homebuilding shows signs of easing. And while there seems to be no disposition to cut major investment schemes (steel and chemical expansion is going ahead), some businessmen are holding back, watching the business portents in the U. S. A.

They feel the slackening of export demand, both in Europe and overseas. Import restrictions in France, India, and elsewhere hurt. If world trade should slump, a country that earns a fifth of its national income through exports would be hard hit.

But for all these signs, new forces promise future growth.

Most important is government spending. Between now and 1961, military outlays should soar—to some 55,000-million marks instead of the originally estimated 45,000-million. Indemnities to Nazi victims are expected to rise, as is social welfare spending.

While rearmament will call more Germans to the military service, there should be enough labor reserve. Heavy industries seem likely to take defense production in stride. What they cannot fit into their production plans with ease, they will buy abroad.

So the chief limits to growth will be demand overseas, and, at home, the extent to which the government will seek expansion even at the risk of some price increases.

German businessmen wonder how much growing domestic demand will compensate for lower sales abroad. Consumption of industrial goods has been rising steadily. Wages, it is true, are still rising only roughly in step with productivity, and consumption takes barely 60% of the national cake. It could well take more.

Still, the plans of consumer industries form one of the stable elements in the order books of capital goods producers. German workers are beginning to buy refrigerators, TV sets, even autos.

So even if Germany is unlikely to repeat in the next 10 years the spectacular growth of the past, it should remain an expansive force. The consumer is coming into his own. Much rewarding investment remains to be done in housing, fuel, transport, and in raising industrial productivity.

Meanwhile, the most immediate economic problems are not those of recession, but of the payments surplus and the capital market.

A measure of the dynamism of German exports is the nation's huge pile of gold and foreign exchange reserves (which reached a $5,900-million peak last September), making it one of the world's great creditor nations. Fortunately for Germany's trading partners, that total has dropped off and the franc, pound sterling, and other threatened currencies are breathing easier. Furthermore, German capital exports have been growing, and they may become larger still this year.

But there is little to suggest that the surplus on current account will not continue to grow too. Germany has a strong export position. Rapid gains in productivity have kept German exporters one jump ahead of competitors.

While the payments surplus troubles foreigners, a shortage of capital at home plagues German businessmen. Deflationary budgets, tight credit policies, have kept interest rates high.

Today, both the government and the central bank are trying to ease these tensions. As defense spending grows, the budget may even dip into deficit. Also reductions of the discount rate has caused a general fall in interest rates. For the foreign businessman, the drop in rates is the most encouraging feature of the German scene, reflecting both the easing of the investment boom and the possibility that some day Germany may export more of its large savings. At the same time, significant increases in costs are taking place.

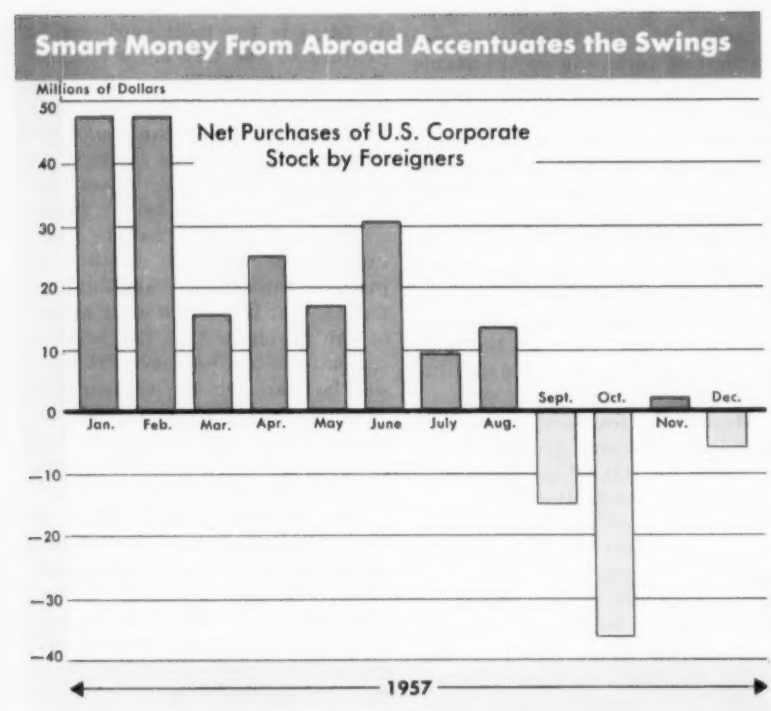
This is not to say that the Bonn government will not continue to preserve the currency and fight inflation. But it is much more aware of the problems that the surplus causes trading partners. It may well be that costs in Germany will have to rise further, compared to those elsewhere in Europe, paring profit margins, raising consumption and imports.

The German leaders have a tremendous responsibility in managing their economy in 1958. They alone, with their cushion of foreign exchange, their cost advantage, their labor reserves, can take the lead in a renewal of European business expansion. ●

Digested from The Economist, Jan.25, p287; Feb.1,p382

How Foreigners Act on Wall Street

Digested from BUSINESS WEEK, Feb. 22, p147



FOREIGN INVESTORS are playing a more dynamic role in the American stock markets. And the activities of these businessmen, speculators, banks and other institutions overseas are being watched more carefully by U. S. investors.

Recently, the impact of foreigners on Wall Street has been on the "down-side." The charts (left) show that last year, investors abroad pumped additional buying strength into the market through the July peak, then emptied their portfolios abruptly. Note especially the figures for October.

Undoubtedly, selling by foreigners aggravated the decline—even though the net amount was relatively small by Wall Street standards. This is partly because—rightly or wrongly—money from abroad has gained the reputation among Wall Street traders as being both "smart" money and "hot" money. It supposedly owes allegiance to no nation, to no stock, but flows wherever a fast profit can be made.

This reputation may rest on shaky ground. But its effect is unmistakable. Many U. S. traders try to pick the same securities as their foreign counterparts. While others (having been hurt by this form of guessing) do not, all concerned have come to watch foreign buying and selling carefully.

In years past, overseas investors—mostly the European moneyed classes—have bought U. S. common stocks only on a very selective basis. Railroad, utility, and raw-material producing companies dominated the purchasing pattern. However, since World War II (and particularly in the past three years) these investors have been aware of broader opportunities. Partly this increased activity is a result of currency weakness abroad, partly a desire of the new rich in Europe, Latin America, or the Middle East to find new investment outlets.

For example the value of nonresident holdings of U. S. corporate stocks was only $2,400-million in 1946; by 1956 it was $6,300-

million, and now is close to $7,000-million.

While they have many of the same motives as U.S. investors, Wall Street's foreign clients are different. Because they are almost wholly from highest income brackets, they are considered more sophisticated than small U.S. investors. Also, they are willing to play market turns more boldly.

In the past few years, a new group of company stocks have attracted them. They still buy old favorites (railroads) and "blue chips" (General Electric, General Motors, the steel shares), but they invest in a much wider variety of stocks. They are leaning toward those companies whose products they recognize abroad; they are interested in American corporations expanding overseas.

There are of course differences in investors from country to country. In many nations, an investor has to pay an exorbitant premium to get dollars to buy U.S. stocks. In Britain, there is only a limited pool of funds available for U.S. purchases. In Holland and Switzerland (which account for a large part of the investment), dollar stocks can be bought freely at parity. This is also true for many Latin American and Middle East investors.

The lure of U.S. stocks is potent for many foreign traders. For one thing, they do not have to pay capital gains taxes. Since a U.S. investor cannot easily take a capital gain until he has held a stock for six months, he is often "locked in." But outsiders can trade and speculate freely, continually shifting to new money-making channels.

Also, U.S. stock prices fluctuate more than stocks abroad. The volatility of U.S. markets is appealing to professional investors.

These professionals speculate widely, and are considered by Wall Street experts to be very susceptible to "tips." London brokers were notable losers when prices of cheap Canadian mining and petroleum stocks collapsed. Even the sagacious Swiss were reportedly caught in the plummeting fall of a railroad stock from $58 to $22.

But the speculative tendency does not mean that all foreign investors constantly move in and out of the market. Often, they share the same kind of long-term investment goals as Americans do, and growing activity of this kind by Europe's institutional investors is a restraining influence on speculation. These investors are not above taking short-term gains, but they basically invest for the long term—influenced to a degree by the expectation of currency strength or weakness.

This expectation explains in part why foreigners are now net sellers of U.S. stocks. They have lived through many inflationary periods, usually more violent than U.S. investors have experienced. And they seem more painfully aware of the Great Depression than Americans. So they are alert to the problems of the U.S.A., and they seem to prefer waiting for a while until American economic trends become clearer. ●

New Approach to Atomic Trade

How large an international market for nuclear power equipment? And who will win it?

NEWS THAT JAPAN has finally decided to buy a British natural-uranium atomic power plant (MD —Feb.,p8) has stimulated more discussion about world trade in nuclear equipment. How large will the trade be? And who will win it?

The Americans, in the midst of a reappraisal of their own atomic program, are concerned. That is one reason why the journal *Nucleonics* just completed a survey among leaders of the nuclear power industry in the U.S.A. and overseas.

The survey found—among 85 American atomic industry experts —a new emphasis on speeding up the U.S. program, to obtain economic power as quickly as possible (even though such power is not yet vital in the fuel-rich U.S.A.). They want to place the U.S. atomic industry in a better position to promote foreign projects.

To that end, *Nucleonics'* respondents called for the government to work more closely with equipment makers—even to providing subsidies for overseas projects.

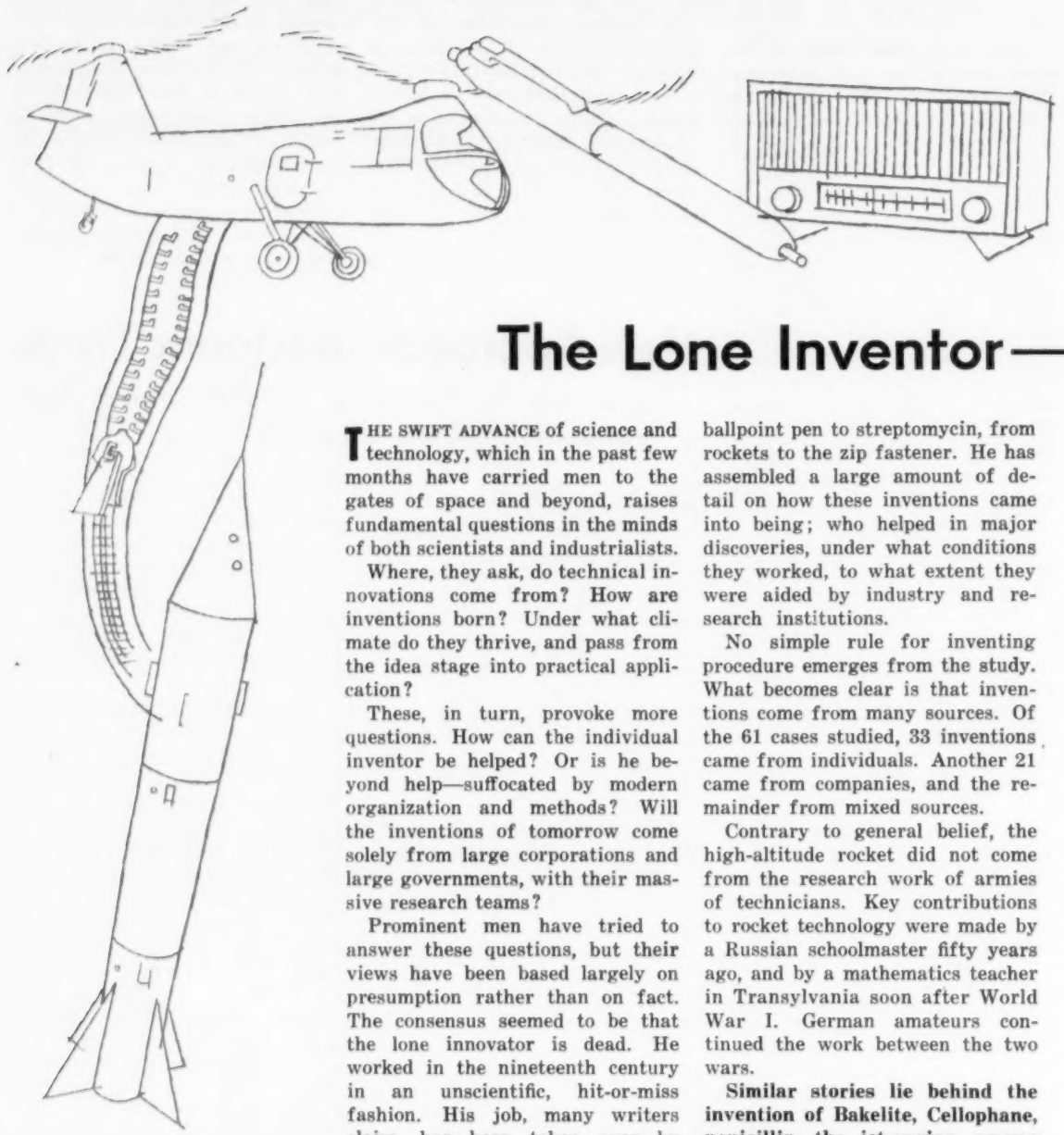
Fifty overseas respondents—including manufacturers, utility executives, and government officials —added some frank comments about a "lack of American salesmanship" abroad. But they did emphasize that a large amount of imported nuclear equipment would be bought in years to come. The likeliest suppliers: The U.S.A. and the United Kingdom. (Some observers suggest that the Russians may well show interest in exporting atomic plants, and other nations—the French, Swedes, Swiss, for example—will supply specialized parts and equipment.)

No one is sure how much trade will develop. One American manufacturer estimates the total overseas nuclear market potential at $3,115-million through 1967. *Nucleonics* believes this may be slightly high.

On the other hand, Japanese experts told *Nucleonics* they might import as much as $325-million worth of nuclear equipment by 1968; the Germans spoke of $200-million; the Italians, $150-million. The Swiss, Australians, and Belgians believed their imports would run between $40-million and $60-million. Others—Mexicans, French, Dutch, for example—declined to guess, but stressed they were in the market.

Many factors will influence these importing decisions. The survey respondents spoke of problems of cost and financing, fuel, a determination to catch up to nations with more nuclear experience. Many added that the British seemed to be ahead of the Americans in demonstrating a working commercial power reactor, and then going out to sell it.

This is an impression the Americans want to erase. The first commercial power plant in the U.S.A. is now operating, and there are signs of a more concerted attack on foreign markets by U.S. manufacturers of nuclear goods. The "new approach" may be in full swing by next September's United Nations atomic conference in Switzerland. ●



The Lone Inventor—

THE SWIFT ADVANCE of science and technology, which in the past few months have carried men to the gates of space and beyond, raises fundamental questions in the minds of both scientists and industrialists.

Where, they ask, do technical innovations come from? How are inventions born? Under what climate do they thrive, and pass from the idea stage into practical application?

These, in turn, provoke more questions. How can the individual inventor be helped? Or is he beyond help—suffocated by modern organization and methods? Will the inventions of tomorrow come solely from large corporations and large governments, with their massive research teams?

Prominent men have tried to answer these questions, but their views have been based largely on presumption rather than on fact. The consensus seemed to be that the lone innovator is dead. He worked in the nineteenth century in an unscientific, hit-or-miss fashion. His job, many writers claim, has been taken over by armies of technicians.

These theories have been sharply questioned, if not shattered, by a new scholarly examination of the history of modern invention. The findings are part of a four-year survey recently completed by Professor John Jewkes of Oxford University, and two assistants, David Sawers and Richard Stillerman (*The Sources of Invention*, Macmillan, London, 1958, 31/6d).

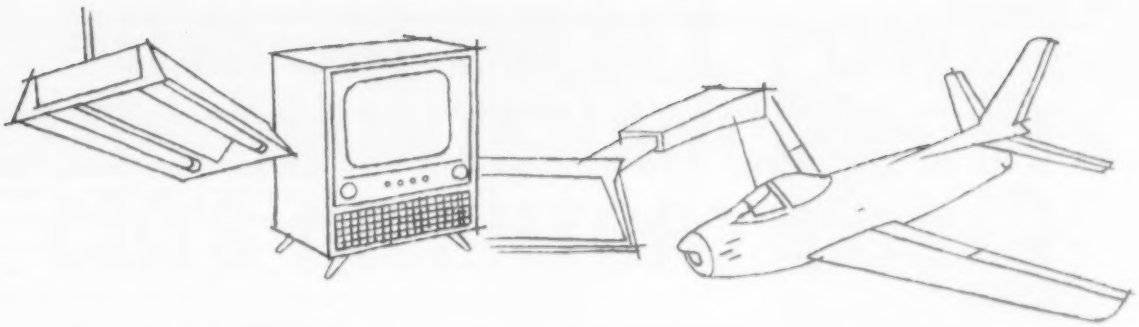
Professor Jewkes has examined the roots of some 60 inventions of the twentieth century—from the ballpoint pen to streptomycin, from rockets to the zip fastener. He has assembled a large amount of detail on how these inventions came into being; who helped in major discoveries, under what conditions they worked, to what extent they were aided by industry and research institutions.

No simple rule for inventing procedure emerges from the study. What becomes clear is that inventions come from many sources. Of the 61 cases studied, 33 inventions came from individuals. Another 21 came from companies, and the remainder from mixed sources.

Contrary to general belief, the high-altitude rocket did not come from the research work of armies of technicians. Key contributions to rocket technology were made by a Russian schoolmaster fifty years ago, and by a mathematics teacher in Transylvania soon after World War I. German amateurs continued the work between the two wars.

Similar stories lie behind the invention of Bakelite, Cellophane, penicillin, the jet-engine, among many others. The gyrocompass was invented by a scientifically-inclined young man who was neither a scientist nor sailor. The process for making soap came from the lone efforts of a chemist working in the oil industry. The basic inventions surrounding radio came from the independent work of scientists in many countries.

Professor Jewkes and his associates clearly distinguish invention from product application. Though the invention of the rocket has come from individuals, its refinement and development has been



Must He Be Whipped into Harness?

the work of large teams of technicians. Here large industrial laboratories have an obvious advantage: They have the time and money to do long-range testing and pilot plant work.

Inventions in certain fields lend themselves to mass attack. In chemistry, especially, innovations often are intricately interwoven with stages of development. They form links in a chain of discovery.

You can see this in the type of inventions originating in large research laboratories: nylon, synthetic detergents, polyethylene, silcones, and the transistor. Nylon came out of a 10-year basic research program initiated by E. I. du Pont de Nemours & Co. in the U. S. A. The laboratories of Imperial Chemical Industries, Ltd. gave the world polyethylene, one of the most versatile plastics. The transistor grew out of studies of semi-conductors by the U. S. A.'s Bell Laboratories.

Having decided that the lone inventor has not disappeared in the twentieth century, Professor Jewkes and his associates take a look further back. Was the nineteenth century truly an age when uneducated inventors worked blindly, divorced from science, and stumbled on good things mostly by chance?

The evidence paints a contrary picture. Science and industry did not live in separate worlds, as is often supposed. James Watt, inventor of the steam engine, spent much of his time with distinguished scientists. Thomas Edison, one of the great names in American industrial innovation, used the Princeton University laboratories and owned an extensive library of scientific works.

Though many of these inventors were self-educated, they had access to scientific knowledge and the work of their contemporaries. Scientific periodicals were available, and they were put to use. Many inventors and scientists collaborated in a way that modern management would call "teamwork."

Nor were inventions of the nineteenth century mainly accidental. Often an inventor stumbled on one good thing while looking for another, but this happens today. Chance plays a large part even in the work of major industrial laboratories. The discovery of polyethylene, tetraethyl lead, Freon refrigerants, Duco lacquers, all owe much to chance.

Comparing the inventive practices of the nineteenth and twentieth centuries, it is clear that many writers have exaggerated the differences between the two periods. A continuity runs from one to the other. Individual initiative and creativity, as in the past, still provides many major advances in science and technology.

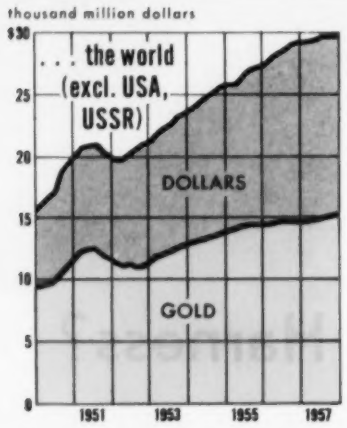
Despite this debt to the lone inventor, the modern tendency is toward teamwork. Scientists are encouraged to share their knowledge, and become members of large research groups. Inventors are being enticed into the laboratories of large corporations. Even the university, long a refuge for the eccentric researcher, has turned its attention toward large-scale applied technology.

Professor Jewkes questions whether such group action is most favorable to the flow of new ideas. This mass assault on technical problems may result in many minor improvements, but it can also stifle originality. Men of great inventiveness are to some extent a race apart. Many of them find their powers of innovation dampened by a large research group.

The virtues of the "team" can be overrated. It is to some extent a necessary evil, the result of the increased specialization of scientists and technologists. But it is only a second best, according to Professor Jewkes. "There is no kind of organized coordination," he writes in *Lloyds Bank Review*, "which approaches in effectiveness the synthesizing which goes on in one human mind."

How can a business organization or community find a framework conducive to invention? The study of recent inventions indicates that key discoveries come from many sources, often unexpectedly. They come from big firms and small, from ever-growing research teams, and from the lonely innovator working in his cellar.

The logical answer is to encourage just such a multiplicity of research agencies. Universities, large corporations, profit and nonprofit laboratories—and the independent inventor—all must play a role in the program. In contrast to other fields, what is needed is a generous overlapping of efforts. Professor Jekkes suggests that the world needs "lots of the so-called wastes of competition, and all the vigorous untidiness so foreign to the planners who like to be sure of the future." ●



Gold and dollar reserves, still climbing, are enough to maintain the world in a good position to meet some old troubles.

Gold: Traveling Again

Digested from ENGINEERING & MINING JOURNAL, Feb., p127

GOLD may be a chemically inert metal. But it is also a monetary metal that combines readily with dollars, at $35 a fine ounce. Analysing gold with the eye of an economic alchemist provides perspectives on 1957, and poses important problems for 1958.

In 1957, gold output in the non-Communist world (and probably in the Communist world) rose for the fourth consecutive year. And over half the total found its way into central bank reserves, some of it by way of the Soviet Union gold sales in Western markets.

Thus the world's monetary reserves grew. But one healthy trend of the past was reversed. For the first time in six years, the world showed a net loss of gold and dollars in its balance of payments with the U. S. A. Many important trading nations were forced to draw down reserves.

Nevertheless, there is hope that the world's reserves generally (with perhaps special help for nations in particular trouble) are strong enough to resist this and other 1958 challenges—provided a worsening U. S. recession does not cause a drastic drop in American imports and other payments. Fortunately, that doesn't seem likely.

I. World Production

Excluding the U. S. S. R., world gold production was about 30-million fine ounces last year, up substantially from the 1956 production of 28.6-million oz., but still 6.7-million short of the all-time high in 1940. At $35 an ounce, last year's output was worth some $1,050-million.

In South Africa, the world's Number One producer, output hit 17.2-million oz., the highest ever, and a gain of 1.3-million oz. over 1956. Thus the South Africans are almost wholly responsible for last year's increases, as in 1956.

South Africa's added output is coming primarily from the new, rich mines in the Orange Free State and Far West Rand. The production of these mines increased from less than 0.5-million oz. in 1953 to 1.3-million in 1957. Output will continue to rise for years to come. And for future reference, note that a lease was granted last year for an "ultra-deep" mine: Mining will begin at 1,700 meters and may go as deep as 3,700. Production should get underway in six or seven years.

There was also added output last year from Ghana and the Belgian Congo. Elsewhere, outside the Soviet Union, production remained more or less the same in Canada, the U. S. A., Australia, India, the Philippines, Southern Rhodesia, and Latin America.

Russia does not release official figures on gold, but a London bullion dealer, Samuel Montagu & Co., estimates that Soviet output is now equal to South Africa's.

Canada's 4.4-million oz. last year makes it the second largest non-Communist producer. A growing portion of Canadian gold is being produced as a by-product of expanding base-metal operations.

Gold mining costs continued to rise, putting a premium on high-grade ores. There is more discussion in South Africa these days about closing some of the older "vulnerable" mines, and a few in Canada have been closed.

But gold is too precious a commodity to give way to simple profit-and-loss economics. Many marginal gold mines continue to operate on subsidy: Subsidized gold usually goes directly into official reserves, in cooperation with the International Monetary Fund monetary policies.

II. Where It Went

About 24-million oz. ($840-million) of gold was added to official monetary reserves last year. Industrial consumption accounted for at least 4-million oz. ($140-million). And over 9-million oz. ($315-million) went into private channels. (The difference between these figures and total non-Communist output—a difference of close to 7.5-million oz.—is accounted for by Russian gold sales.)

The hoarding demand that revived after the Middle Eastern crisis of 1956 remained active during 1957, in large part as the result of domestic uncertainties in France. But in comparison with the waves of hoarding that followed World War II and the Korean War, the hoarding demand in Europe was small.

Private demand for gold was fairly large at times in the Middle and Far East, especially in India. Since gold is an active means of payment in these parts of the world, hoarding demand is difficult to estimate. Gold coins however, fluctuated wildly in local markets dealing in non-convertible currencies, such as Paris and Bombay. This highly volatile coin market reflects local conditions, and has little influence on free markets.

Official monetary reserves of gold and dollars continued to grow in 1957, mainly from new gold.

Total gold and dollar holdings outside the U. S. A.—again exclud-

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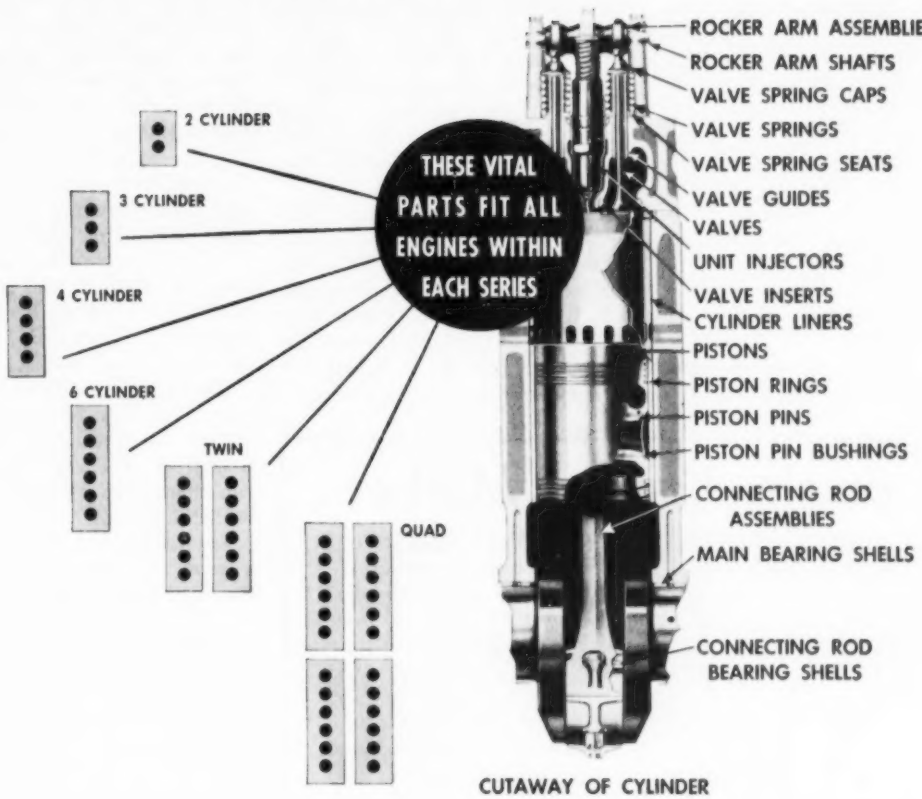

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ing the U.S.S.R.—amounted to $29,672-million at the end of third quarter 1957, or $594-million more than a year earlier, and the holdings grew toward the end of the year. But there were wide differences among countries.

Aggregate gold and dollar holdings of the Latin American countries rose by $589-million, but the rise was almost completely accounted for by oil company payments to Venezuela for new concession rights. Brazil and Argentina (despite a $75-million drawing on the IMF) had substantial declines.

Holdings in non-sterling Asian countries fell by some $400-million. Japan drew on the IMF for $125-million, and still lost $488-million. In Europe, Germany increased its holdings by close to $1,000-million; but France suffered another deficit year, to the tune of some $650-million.

Britain ran a current-account surplus throughout the year. But as banker for the sterling area, London had its troubles. Overseas sterling countries (India, for instance) ran sizable deficits with non-sterling countries, and London's central reserve declined for the second year. Drawings from the IMF, Export-Import Bank loans, waivers on interest payments due the U.S. all helped the situation, however.

Britain's greatest challenge came during the third quarter, as sterling fled the country in fear of inflation and the uncertainties of the European exchange rate structure. Sterling regained strength, however, after London announced its determination to defend the pound (MD Jan., p 11).

Above and beyond these performances, the central fact is this:

For the first time since 1952, the world lost gold and dollars to the U.S.A.—some $300-million during 1957. This is in sharp contrast to the annual gain of $1,000-million to $2,000-million during the previous four years of prosperity.

III. Don't Blame the U.S.A.

This loss, it is important to note, did not come from a decline in U.S. payments—exports to the U.S.A. increased for the fourth consecutive year. There was no "dollar shortage." The U.S. imported more merchandise (in volume and value), and investments abroad were up too. Add to that increased tourism, military expenditures abroad, and economic aid, and you see a respectable payments performance by the United States—involving a total outflow of $27,-100-million, up 5.8% over 1956.

U.S. exports of goods and services were increased by special and temporary factors—the post-Suez petroleum crisis, subsidized cotton sales, and the poor wheat crop in Europe and Asia. And there was a growing demand for American machinery, vehicles, chemicals, coal, metals, goods.

The main trouble in 1957, however, seemed to be "insufficient resistance to inflationary pressures." Countries that ran trade deficits ran them with all areas, not just with the U.S.A.

Speculative capital also played a part, "flying" to the U.S.A., Canada, and Germany. In fact, one of the notable developments of 1957 was the inflow of speculative capital into Germany, fanned by rumors that the mark would be appreciated. This trend was later partly reversed (page 9).

All in all, last year was in disappointing contrast to the healthy pattern of recent years. Nevertheless, there are some encouraging points to keep in mind:

—There has been no general relapse into discriminatory controls over trade and payments.

—Monetary controls have done much to moderate inflationary pressures in many countries.

Remember, too, that much of the current troubles are the inevitable result of a world in transition. As basic long-range changes in the world production pattern take place, there are times such as these when capacity clashes with the rate of industrial expansion.

In time, there is every reason to believe that the world economy will become more flexible, more resilient, and more adaptable. ●

Gold on the London Market

As this chart shows, London gold prices fluctuate within the narrow range set by the U.S. government's fixed price for the monetary metal: ¼% above and below $35 per fine ounce. Within this range, sellers sell for more, buyers buy for less in London than in New York—unless transportation is a factor.

London is the world's leading gold market. The Bank of England handles most of South Africa's huge output, and London also receives the output from Ghana and Southern Rhodesia, as well as gold from non-sterling countries (including Russia).

Principle buyers are the central banks of Western Europe.

Although sales are unrestricted in London, buyers must pay in fully convertible sterling, except for licensed sterling residents buying for legitimate trading and industrial needs. Gold prices therefore tend to move with the sterling-dollar exchange rate. And Britain tries to hold transferable within $2.78-$2.82—within 1% of gold parity.

Gold prices in other convertible-currency markets—Brussels, Milan, Zurich, and Beirut—do not deviate far from London.

Do not be misled by premium prices on local markets trading in nonconvertible currencies: Napolean coins hit a dollar equivalent of $48.60 in Paris; bar gold hit $38.50 in Hong Kong, $60.50 in Bombay.

Such premiums reflect unrealistic exchange rates, local monetary habits, currency and political problems, and the cost of overcoming barriers to the private flow of gold.

Figure Your Profit—Every Morning

At this small engineering firm, supervisors get a daily "profit-and-loss" report on production.

Digested from FACTORY MANAGEMENT & MAINTENANCE, Nov., p94

THE PROFIT RATE was doubled—from 5% to 10%—in six months after a daily "profit and loss" reporting system was set up by the U. S. A.'s Transval Engineering Corp. (Culver City, California). By 9:30 each morning, production supervisors know how each production line performed the previous day, and performance to date on the total job contract at hand.

Before the daily reports were started, supervisors tended to pace production to weekly or monthly quotas. More often than not, this meant overtime pay for workers towards the end of the period, as the supervisor concentrated on finishing and shipping goods. Now supervisors must level out in-process work and shipments, and the rush periods with expensive overtime pay have vanished.

Transval has been in business less than three years. In that time, it has grown from 4 to 300 employees; last year, the company shipped over $2-million worth of airborne electronic equipment.

Between 12 and 15 products are usually in process on as many production lines. Each supervisor receives a daily report for each line under his command. (Transval managers believe the idea would work in almost any operation—even where a supervisor is in charge of only part of a total operation.)

The daily report is used as a management control, not as an accounting report. Only two factors are used: the total cost of operating the product line, and the total value of goods shipped.

Experience has shown that on individual contracts, the daily reports reflect profits within 5%. Thus management gets a fast check on profits while the project is in process. In fact, Transval lowered its selling price on two contracts on the basis of favorable early returns.

The report is compiled from sources readily available—time cards, requisitions, contract schedules, and shipping orders. Profit or loss is figured as the simple difference between Business Shipped (the number of units shipped or accepted by customer's inspector, multiplied by the unit selling price) and Costs for the Day. Cost figures are arrived at by taking:

Direct labor: Hours taken from time cards are multiplied by wage rates. A timekeeper on the second shift makes the calculations.

Overtime: Figured the same way, if there is any.

Manufacturing overhead: The rate for the previous month is used. It is a percentage of direct labor costs.

Direct material costs: Based on standard costs for each unit produced, calculated every two weeks. Adjustments are made for changes.

General and administrative costs: Figured as a percentage of total manufacturing costs.

Reports with a profit are reproduced on white paper; if there is a "loss," pink paper is used.

Below this profit figure, there is the Cost Analysis of the Total Contract To Date. This lists total costs, including the current day's report. It also shows how performance compares to the target.

At the start of each new job, Transval sets a target profit rate. On some contracts it might be 10%; on others—priority work, for instance—it may run as high as 30%. Performance to date is measured against this target. If performance is better than the target, the amount is clearly marked "favorable;" if not, "unfavorable." A supervisor making 9% on a 10% target is "unfavorable," and so is one making 29% on a 30% target. ●

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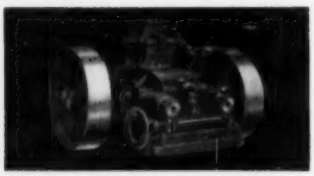
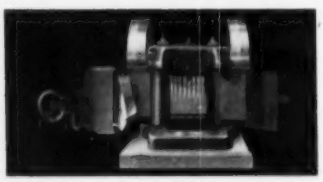
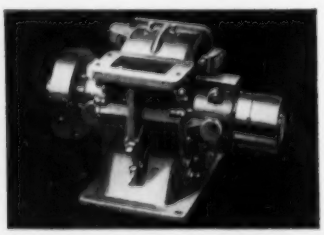


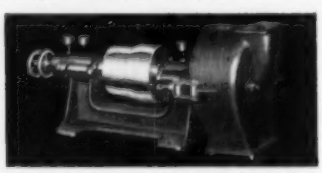
Lab Crushing Rolls: Special lab design. Two models: 8 x 5 in. and 12 x 12 in. rolls. Capacities to 10 tph. Both models adjust down to 20 mesh. Tires of high carbon forgings. Automatic feeder, adjustable controls.



Lab Jaw Crusher: Crushes hardest rocks at ½ to ⅛ in. settings. Roll jaw action — no clogging. Feed opening 2 x 6 in. Capacity to 1900 lbs. per hr. at ½ in. setting. Instant adjustment. Manganese jaws, reversible shield.



Lab Swing-Sledge Mill: 5 x 6 in. opening takes soft, medium, tough or fibrous feed. Capacity to 1 tph. Fines regulate from 1 in. to 20 mesh. Choice of gratings, hammers (or knives).



Sample Grinder: Disc type grinders for dry, friable soft or medium materials. Three sizes — 6 in., 10 in., and 14 in. take feed as coarse as ¼ in. Produces 100 mesh fines at capacities to 200 lbs. per hr. on largest model. Regulate 10 to 100 mesh. In-operation adjustment.

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▶ FINANCIAL DIGEST

The City of Amsterdam has placed the first foreign municipal bond issue on the New York market in over 35 years—$15-million for improvements to the Dutch city's electric utilities and vital waterway to the North Sea.

That is good news for debt financing and the international flow of investment funds. And it indicates how far the dollar bond market in New York has been restored to health.

The World Bank has done much to restore confidence in foreign dollar bonds, with its policy of sharing loans with private investors and refusing to lend to debtors in default to private investors.

But the market itself has restored most of the confidence. Nearly $400-million of foreign government bonds—mostly European, Australian, and South African—have been placed on the New York market since the end of World War II. And the defaulted bonds of defeated nations (Germany, Japan, and Italy) have been restored to good standing. Most of these bonds sell at yields comparable to better-grade U.S. corporate bonds (around 4% to 6%).

Defaults by Latin American countries in the 1930's did much to discredit the foreign dollar bond market. Now, except for Bolivia, all are paying interest on dollar debts, and most are repatriating old bond issues through sinking funds. (But their credit ratings are still poor, and Cuba is the only one to sell new dollar bonds.)

Old Latin American bonds are some of the most speculative investments in New York. Here are recent prices on three Brazilian bonds, all with 2% coupons and $100 par value: a Rio de Janeiro selling at 38, a Rio Grande do Sul at 51, and a Sao Paulo at 92.

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Note a new British bond issue with special features for the foreign investor. In addition to an interest rate of 5% and a cash discount, the bonds can be purchased with transferable sterling, which has been selling below the official exchange rate for sterling; and interest is officially tax-exempt to nonresidents.

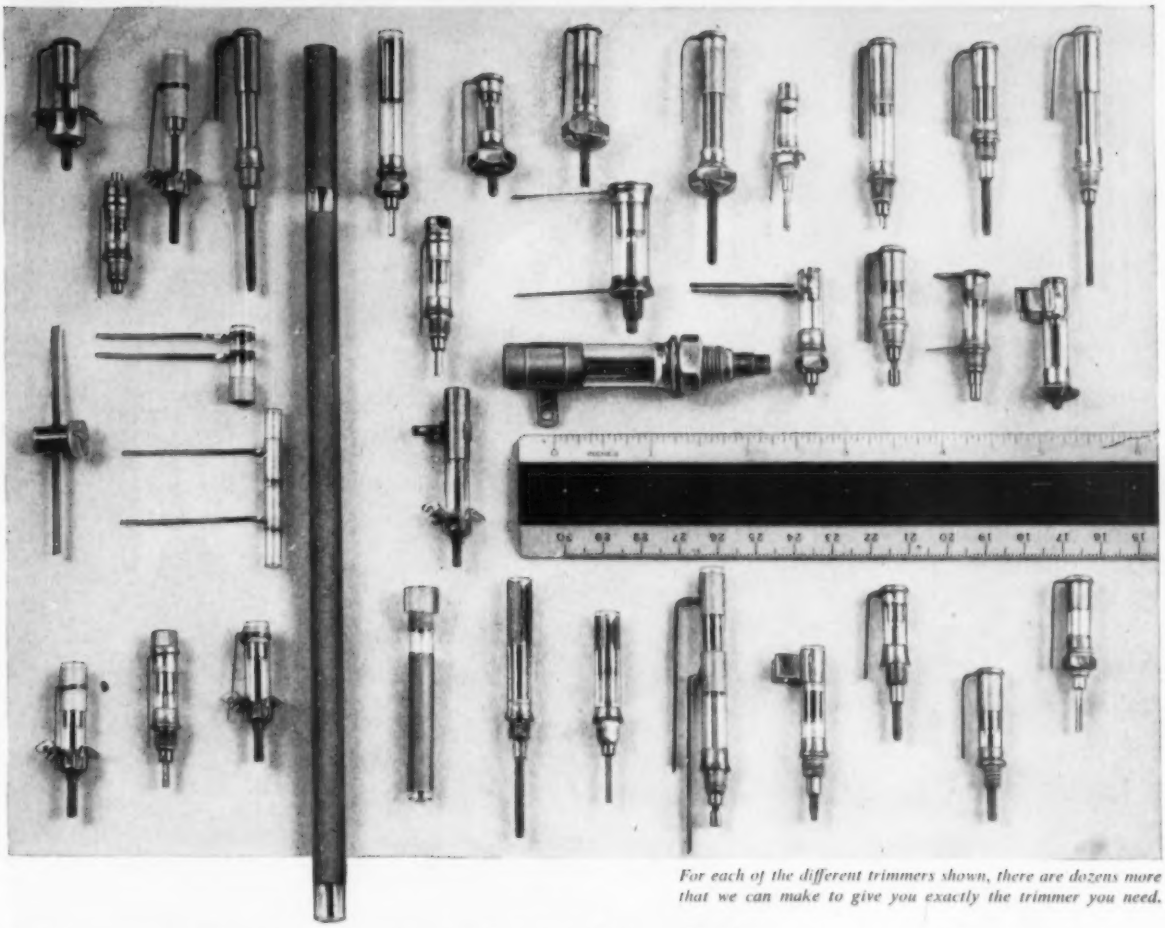
•

A United States Senator has proposed the creation of a new low-interest lending agency.

Senator Monroney suggests a $1,000-million fund, 30% subscribed by the U.S., 70% by the other members of the World Bank. Eugene Black, head of the Bank, is ready to explore the idea.

Presumably, this "International Development Association" would be a risk-taking affiliate requiring no governmental guarantee. The World Bank sometimes turns down loans though it may consider 60% of the loan as "bankable." The IDA could make the loan possible by picking up the other 40%, using mixed currencies as far as possible.

The Senator has something else in mind too. He would like to see the U.S. get out of this low-interest lender's field, to divorce development loans from politics. If the IDA came into being, the U.S.A.'s new Development Loan Fund—earmarked for low-interest loans to less-developed nations—might be abandoned, its assets becoming the U.S. subscription to the new World Bank affiliate.



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Or, if you have your design pretty much worked out and want a manufacturer, let us show you how we go about giving you what you want along with extra measures of miniaturization and stability.

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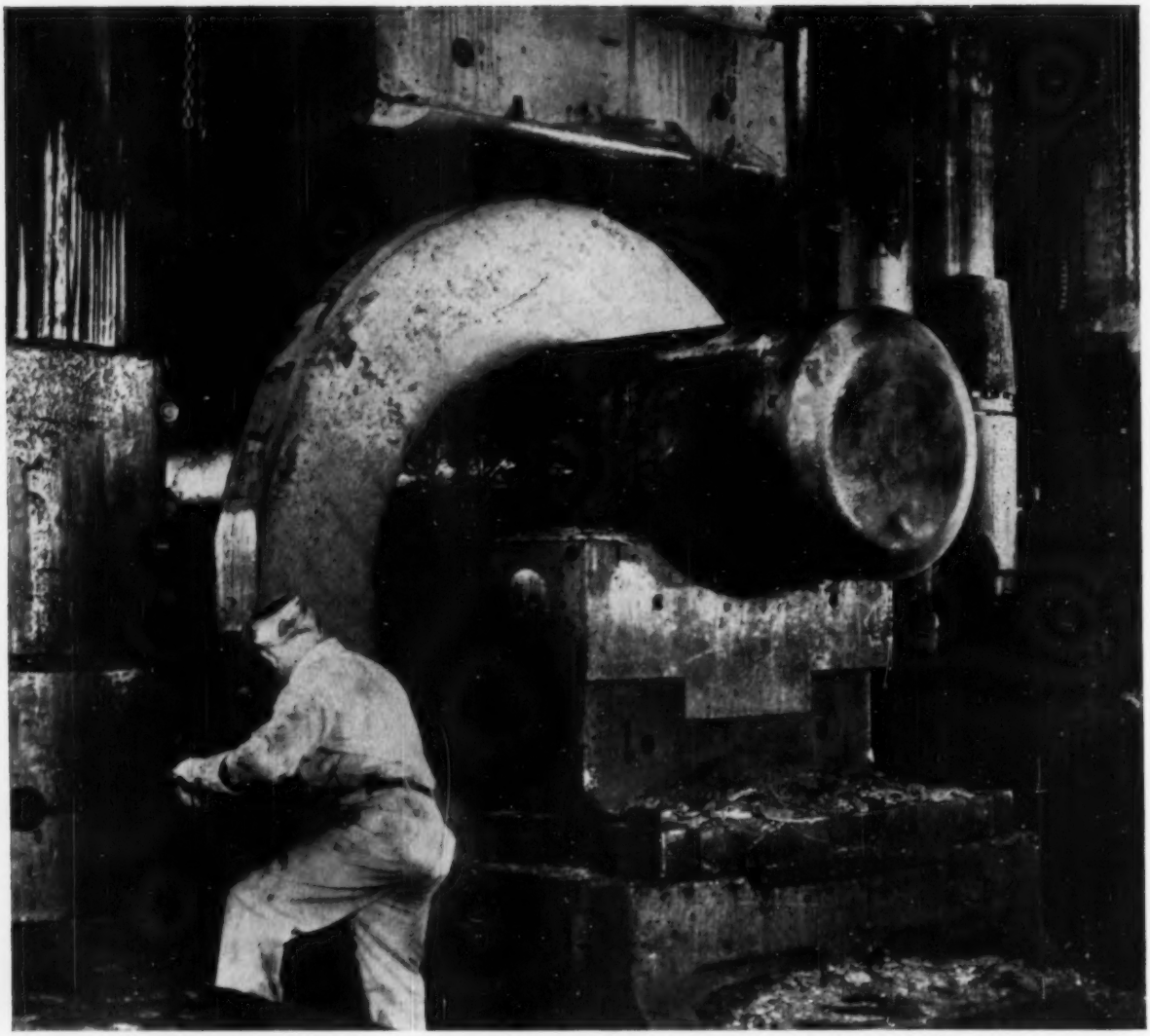

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Checking Your Company's Efficiency

An internal audit can be a watch-dog against inefficiency and waste. No management should be without one.

Digested from BUSINESS, Feb., p66

TWO YEARS AGO, Mr. D. Taylor, deputy company secretary of H. J. Heinz Co. Ltd. of England, found himself in charge of a new department—Internal Auditing. As he tells it, his departmental assets at the time included a job description, two textbooks, several attendances at meetings of the London Chapter of the Institute of Internal Auditors (of New York), some floor space, some enthusiasm, two accountants, and himself.

Today, in Taylor's modest words, the department is "very much in being, and top management is convinced it is doing a worthwhile job." Thus one more company is added to those who believe in the internal audit.

The job, of course, is to guard against waste and inefficiency. Internal auditing has been defined as an independent appraisal of accounting, financial, and other operations, an internal control that measures and evaluates the effectiveness of other controls.

The internal auditor should have no other executive functions. He cannot tell operating men what to do. He cannot install new systems when he finds one that does not work. He may be nothing more than a man who checks figures and sees that honesty prevails. Or, at the other extreme, he may act as a resident management consultant.

As H. J. Heinz Co. Ltd. saw the job, the internal auditor must:

—**Maintain familiarity** with company policies, plans and procedures, and recommend changes.

—**Design and carry out surveys** to determine whether the company's policies and instructions have been satisfactorily passed on, and guide the departments in their interpretation and execution.

—**Examine every company department procedure,** statistical data and records to evaluate their adequacy and effectiveness.

—**Survey the general pattern of control methods** and procedures to determine whether there is proper coordination between departments.

The new department's job was briefly outlined by H. J. Heinz management in an organizational bulletin, which was circulated to all managers and department heads. And the nature of the premier audit was decided upon.

The functional audit—rather than one covering a single department—was chosen as it reflected exactly what the managing director required of the new internal audit. Many sections of the organization—especially those outside the accounting department—would feel the impact of this type of audit.

The receipt, storage, and issue of raw materials was selected as the operation that gave a wide coverage of departments, was controlled by an official written procedure, and involved considerable amounts of the company's money.

The audit would start at the factory gates where the goods arrived and would end at the point of transfer to the user department and the beginning of the build-up of authority for payment.

The next step was to plan the audit.

Mr. Taylor published his objectives as follows: "to examine and appraise procedures in order to ensure that (1) modern methods were being used to keep pace with changing conditions caused by company growth; (2) complete control and security was exercised over company property; (3) notification of the receipt and stock levels and issue of goods were given to the departments concerned as soon as possible; (4) accurate records of receipts, stock in stores, and issues were maintained."

Everyone concerned with the audit was notified of its starting. The factory manager and controller were asked to comment on any phase of the operation they thought were weak points. This friendly approach was good for morale.

The audit proceeded well. Mr. Taylor and his men travelled with barrels of vegetables from factory gate to the barrel park to the receiving point in the production department. Cart loads were followed from packaging materials storage sheds to the filling and labelling departments. The issue of engineers' stores against maintenance department requisitions were observed. Physical stocks of raw materials were compared against recorded stocks.

The various departments and the efficiency and ability of the supervision was appraised. Fire appliances were examined. Checks were made to determine if there was a duplication of forms, and if their routing was the shortest distance between two points.

As inquiries came to an end, a draft audit report was prepared. It consisted of short reports, covering the function audited. In order to communicate the reports to all concerned, separate meetings were held for each group. A representative was given a copy of the report that applied to his department. Copies of the individual reports were also sent to the managing director, director of manufacturing, factory manager, and controller. A confidential report, making observations and recommendations, was sent to top management for consideration.

H. J. Heinz Co. Ltd. finds the response to the audit has been good; some of the recommendations have been implemented, and others are moving through the discussion stage. To be sure, a 100% success cannot be claimed. However, many valuable lessons —and probably many mistakes— were learned in the course of the audit. And the department is now a permanent fixture at Heinz. ●

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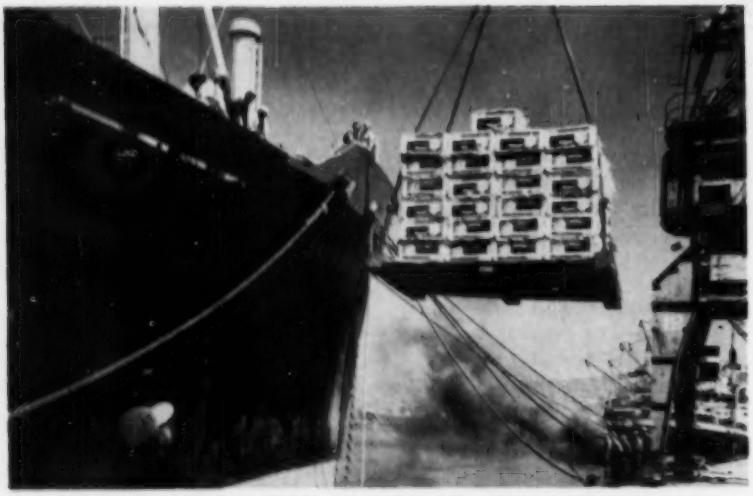

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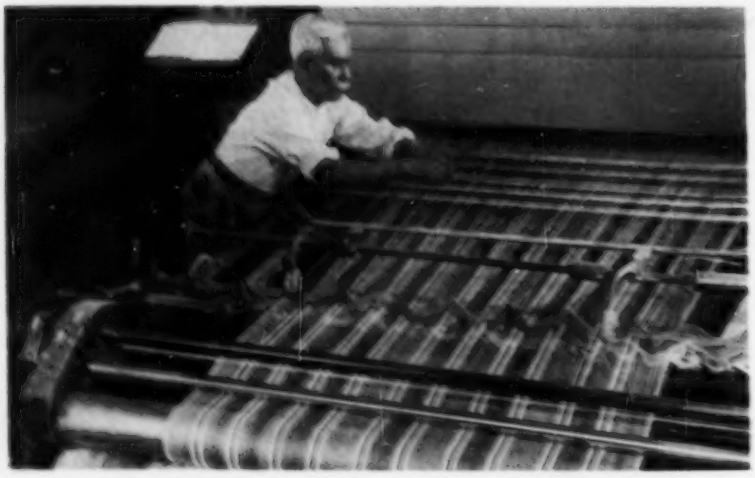

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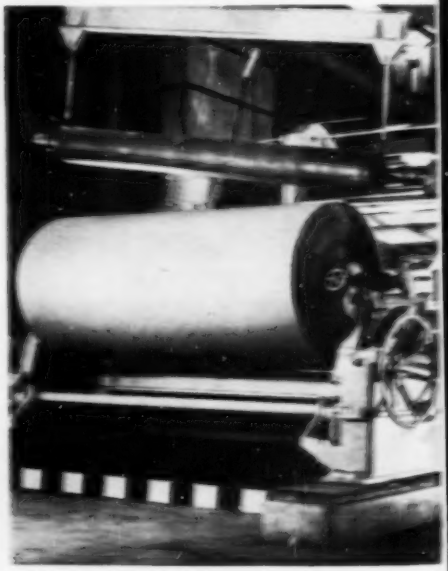

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The expansion continues. So far this year, W. R. Grace has (1) launched a $23-million ocean liner; (2) opened an $18-million polyethylene plant in Louisiana, U. S. A.; and (3) created a paper division to oversee a $50-million expansion in Latin America.

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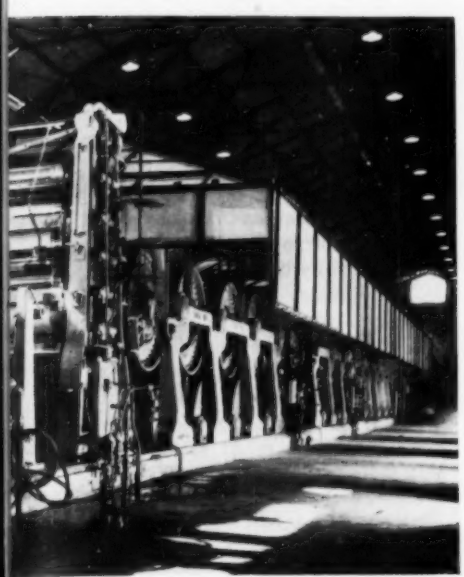

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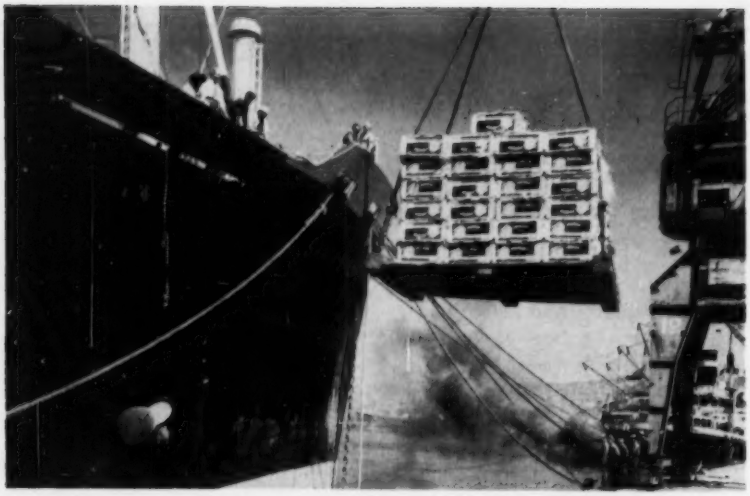

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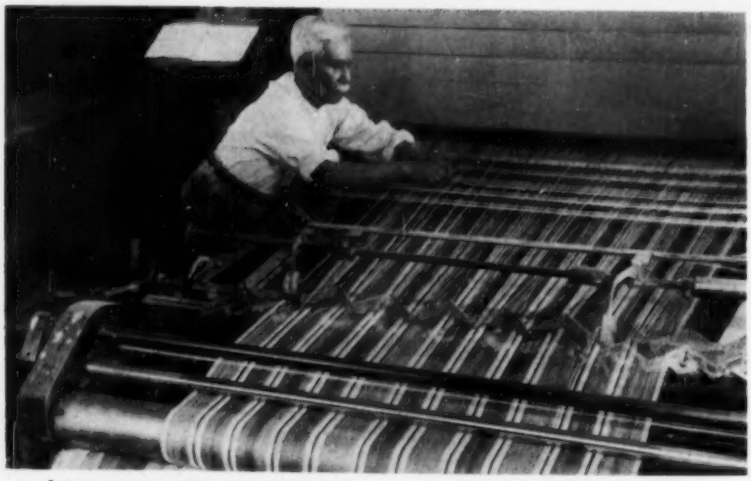

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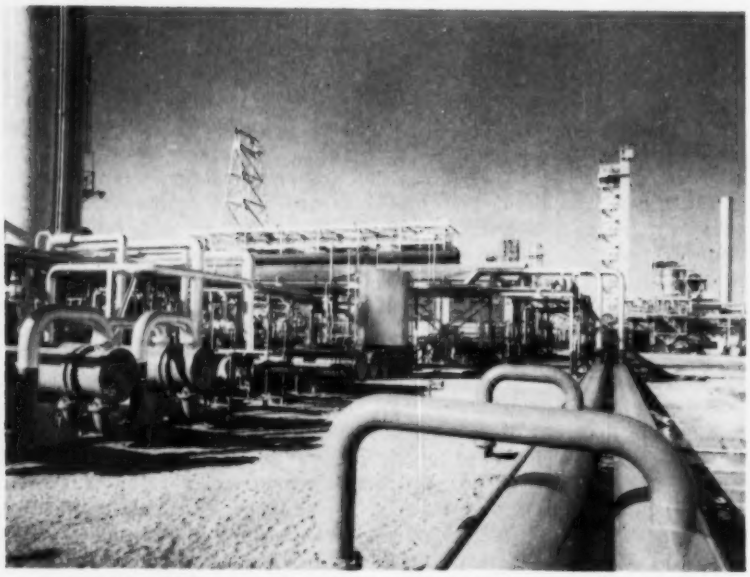

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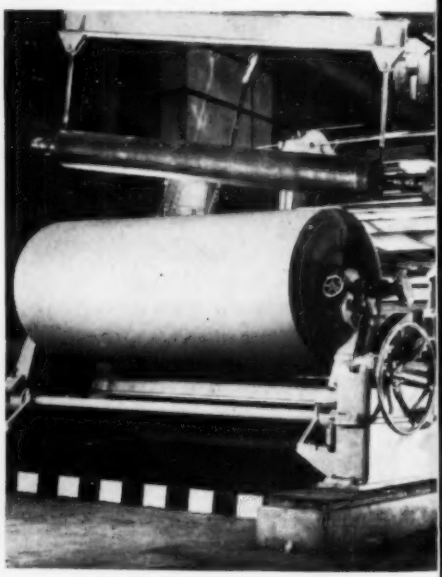

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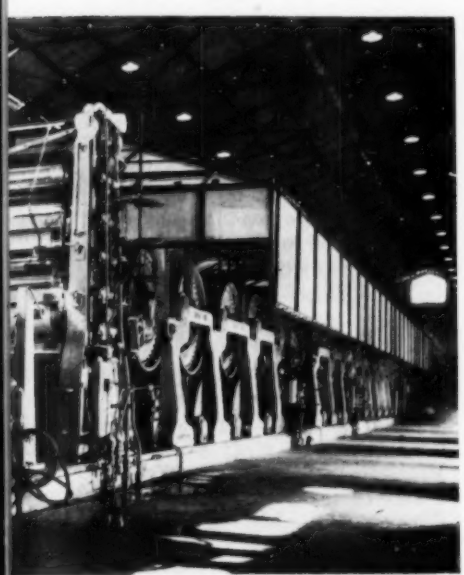

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that Grace will become primarily a paper and chemical company.

Thanks to its pioneer work with bagasse paper in Peru, Grace is already the second largest paper maker in the southern hemisphere. It aims to be first. Present facilities are expanding; new bagasse paper plants are going up in Puerto Rico and Colombia; others are planned in Cuba and Mexico. In Brazil, there is to be a paper mill based on eucalyptus trees.

With South American paper consumption at 20 lb per capita (compared to the U.S.A.'s 435 lb.) Grace sees a bright future. The demand is there. The company is known, and local governments and business will work with it. Finally, U.S. and European paper technology is geared to northern forests, while Grace is working with tropical raw materials.

Paper and chemicals go together. Already, the company is carrying its new chemical competence southward—with plants underway or planned in Trinidad, Peru, Puerto Rico, Brazil.

"From now on," says Peter Grace, "We will go anywhere that the market for chemicals and paper takes us."

But the growth of these new Grace industries in Latin America creates transition problems, similar to the ones that appeared in the U.S.A. The managers who will run the new operations are specialists, not generalist traders who started in the mail room. Again, the "new" Grace impinges on the old. As a result, the paper and chemical business is divorced from the old area groupings.

Even the shipping business is becoming "new" Grace. The near-monopoly the Grace Line once enjoyed on the West Coast is no more. Yet even with new competition, the line's business is growing. A new fleet is planned, with "container" ships using the latest cargo-handling techniques. And though the airline—Panagra—has never made much money for Grace, and may have suffered from the disagreements of its owners (Pan American World Airways owns the other half), it is battling competition, seeking new routes, and planning for tomorrow. (*Digested from Business Week, Jan. 25, '58, p104*) ●

To Be a Better Executive

¶ Concentrate on Cardinal Responsibilities

All successful executives share one crucial characteristic: That is the ability to isolate and concentrate on their really essential jobs, discriminating between what the executive himself must do, what can be done by others, or neglected.

To determine "cardinal responsibilities," list all the activities by which you could contribute to your organization's mission. (Most important: You must understand that mission!) By analysis and discussion with colleagues, select those jobs that you and you alone can best discharge.

The cardinal responsibilities may not be obvious ones. Nor is concentrating on them easy. Inevitably they mean hard, risky decision-making. It is tempting to wander back to the fascinating details of earlier, functional work. Avoid them at all costs.

¶ Start Delegating, Deputizing, Directing

Delegation rests on trusted and trusting subordinates who know the precise area of their own authority. Management by delegation is management by exception: Only you can define what is the rule, what is the exception.

Begin with your closest associate, your secretary. Let her, for example, do all filing, and all letters save those that really require your personal touch. Carry the same plan forward with all subordinates.

It is a far more artful feat to share the load than to carry it yourself. Better results, too, because a well-led team can outproduce any of its members, and a by-product of team effort is well-trained management talent.

¶ Set Up a Comprehensive Work Schedule

You need a plan for daily duties, another for weekly, quarterly, annual, and periodical duties. But stay flexible.

The plan embodies four factors: (1) Your cardinal responsibilities; (2) the needs and abilities of the subordinates; (3) the natural tempo of the work; (4) personal elements such as the time of day when you are at your best.

Remember that effective executive behavior resembles that of a symphony orchestra conductor. To have time to direct, correct, examine, exhort, the administrative detail for which you are responsible must be programmed. You would discharge an office manager who made only haphazard use of a new electronic data-processing machine. Yet such equipment has infinitely less cybernetic capacity than your own mind.

¶ Manage Your Time, Find Some Solitude

Time management is time consciousness, a constant awareness that there is too little time to give even your cardinal responsibilities the attention they deserve. Time management is produced by an ability to read critically (and swiftly, with retention); by avoiding those who do not pay time the respect you must; by impatience at long interruptions from your work.

Your work year is only about 2,000 hours long; it must be husbanded. On the other hand, avoid taking work home with you. This can be a subtle force that tempts you to procrastinate while at work.

Above all—seek solitude. Solitude is the opportunity to use without interruption the time you have saved by the measures above. It is the chance to ponder, plan.

To win it, you must erect a thick wall between you and the many who would rob you of solitude. It can be a hide-away room in the plant or office; an afternoon regularly spent in a study at home; or at least a tightly-closed office door.

One of the more important contributions you can make to your business is creative thought about its needs, present and future. (*American Business*, Feb., p20). ●

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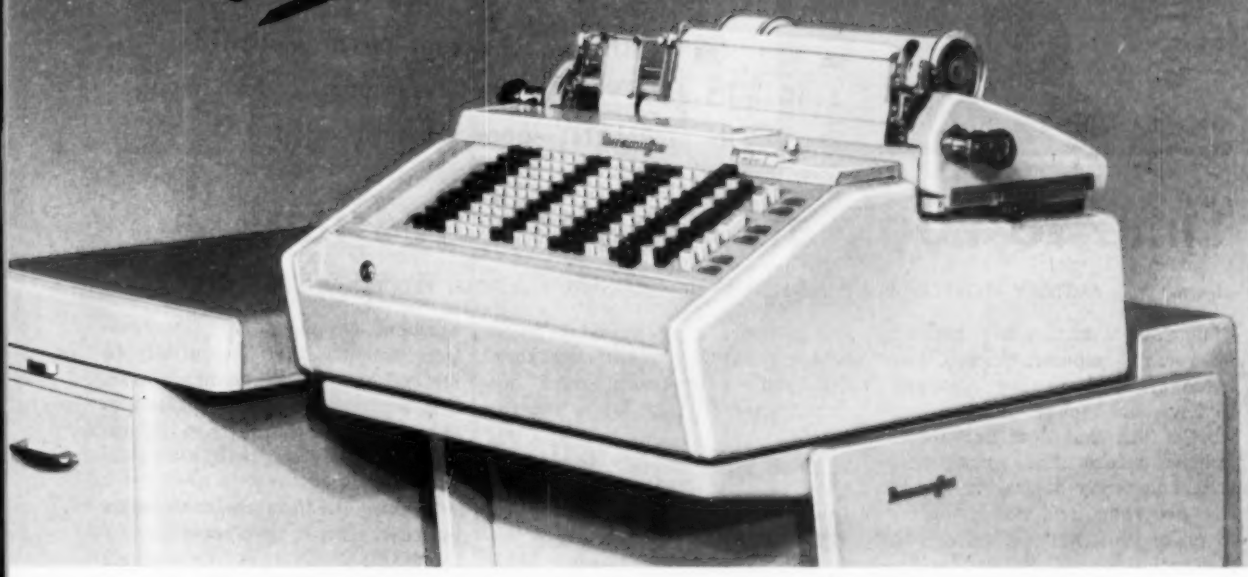

Now, ledger keeping with the advantages of both a visible record and magnetic storage

New Burroughs Sensitronic uses electronic principles to increase accuracy and reduce posting time, balancing time and operator work. This new *Electronic* accounting machine . . .

- *Automatically reads* the old balance from the ledger
- *Automatically checks* the accuracy of the old balance
- *Automatically feeds* the ledger to the correct posting line
- *Automatically extends* and *proves* the new balance
- *Automatically proves* posting to the correct account
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- *Automatically produces* periodical trial balances
- Produces either a ledger or both ledger and statement simultaneously in original print

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Time to Look at Suggestion Plans

Digested from FACTORY MANAGEMENT & MAINTENANCE, Feb., p110, EUROPEAN PRODUCTIVITY, No. 27, pp26, 35

SUGGESTION PLANS are not universally popular. Indeed, some managers suspect they cost more in time and money than they are worth. But that does not prevent industrial executives everywhere from constantly discussing suggestion programs, and wondering how to make them more effective—and popular.

Especially this year. Businessmen in many nations are forced to find ways to reduce costs, improve productivity and profitability. Time and time again, employee suggestions have shown the way. So it is worth hunting them out.

A good suggestion program needs careful planning and administration, and a lot of promotion among employees. This is the theme of three recent studies which describe suggestion plans in the U.S.A., Australia, and West Germany.

I. Suggestion System: U.S.-Style

The U.S.A.'s General Electric Co. has a suggestion program that is probably one of the most successful in the country. This is how the final record for 1956 looks today: 113,000 ideas received, roughly 30% accepted; more than $850,000 paid out in awards. And G.E. claims to have made substantial savings through its employees' ideas.

But the picture was not always so rosy: During the early 1950's employees had begun to lose interest in the plan. Such promotion as there was came from a central source. Though the system had the support of general management, local department managers, let alone supervisors, were not encouraged to take an active interest.

When in 1953 G.E. amended its plan, it decentralized responsibility for the administration of the scheme and delegated it to the various department heads. They in turn enlisted the support of the supervisors who were to encourage employees to hand in suggestions.

G.E. attributes the success of the campaigns largely to the care with which they were carried out. Each campaign had three main features:

1. Finding the gaps in present promotion of the suggestion scheme.
2. Designing a program to meet these needs.
3. Measuring results.

Studying the need — Promotion can be costly and time-consuming, so G.E. attempted first to find out what kind of promotion is needed, where, and in what quantity. A survey, the most direct approach, often reveals gaps in existing promotion: Workers who answered a recent questionnaire were not aware of the average award ($26); some believed the rate of adoption of suggestions to be lower than it was. Their answers showed, too, that they had difficulty in writing their suggestions down.

G.E. has found these points useful as guides to a strong suggestion plan:

1. Does the program reflect management support? Since suggestion schemes are essentially a method of upward communication, this support should be obvious to everyone. G.E. found that the appointment of "suggestion-investigators" helped.

2. Does it stimulate continuous interest? If not, then repetition of the plan's advantages—by posters, cartoons, etc.—is the best way to get the message across.

3. Does it support related campaigns? All too often, employees are asked to make suggestions in a vacuum. "Suggestions about what?" is a typical attitude. Make promotion as specific as possible, recommends G.E. For example, when a department is having a waste reduction campaign, that is a good time to invite suggestions.

4. Does it help employees develop ideas? Much of G.E.'s promotion is devoted to this help: The "Golden Ear" (picture, above) enables an employee to make his suggestion orally—or aurally, if you prefer. A tape recording of the suggestion is later transcribed, which the employee approves and signs.

5. Does it report suggestion-plan results? Publicizing participation records and awards totals keeps interest alive and helps dispel "sour grapes" rumors that undermine the plan.

Measuring results — G.E. has found charts a good way of measuring the effectiveness of its program. One shows in graph form the amount budgeted for sugges-

tion awards during the year, compared with the actual total paid.

G.E. also believes in noting unsolicited comments on its program. An unusual confirmation of the plan's success came in the form of a petition that a group of workers spontaneously submitted to its manager, commending the work of a suggestion-investigator.

II. Australian-Style

Monsanto Chemicals (Aust.) Ltd. at Melbourne started its suggestions plan some years ago. But, as the response grew less and less enthusiastic, the company decided in 1953 to review the working of the program, drawing on the experience of other local firms. That the present plan works well (an annual rate of 50 suggestions per 100 eligible employees has jumped to 90 per 100) Monsanto puts down to careful planning and employee-communication. Here are some details of the program.

Administration—Responsibility for the plan's operation rests with a suggestion committee, appointed by the Managing Director. Meeting monthly, the committee consists of an engineering and a production representative, and an industrial relations expert.

When the secretary receives a suggestion, he allots it a number and informs the employee of the number. He then refers the suggestion to the appropriate department head, who in turn consults company specialists about the value of the idea in relation to existing methods.

After these investigations, the department head decides if the idea should be accepted or not. The suggestion then goes back to the committee, which has to decide whether to give an award. Whether or not a suggestion is adopted is entirely up to the executive who will be responsible for its implementation.

Submitting suggestions—All employees are eligible to make suggestions, except directors, managers and, naturally, members of the committee. There are certain restrictions on salaried staff. Ideas for maintenance and repairs can earn an award only if they propose definite and improved methods.

Employees record their ideas on the customary form. Hints on developing ideas are given on the form, as well as an outline of the system. If anyone has difficulty in presenting his idea he can get help from his supervisor, or from a committee member.

Awards—£7.7 . 0 ($20.58) is the average award paid at Monsanto of Australia. "Encouragement" awards are handed out quite liberally (they were given for some 20% of the suggestions received during a recent two year period). In effect, only ineligible suggestions—and there have been a lot of these—receive no award.

An interesting sidelight on awards: Monsanto sets a special premium on suggestions concerning safety.

Publicity — Posters, articles, booklets, as well as the suggestion form, all promote the program. And the results of suggestions submitted by employees are posted up on noticeboards.

Special stress in Monsanto's promotion is put on improvement of efficiency and reduction of

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costs, and the large proportion of suggestions dealing with production matters (37%) is a reflection of this.

Response to the Plan—Monsanto feels it has been good. Chief critics: some foremen, who believe the program is a waste of time and a sop to employees.

III. German-Style

A West German industrialist writing in *European Productivity* takes up the cudgels for his country.

For him, one of the most important points in any suggestion system is the suggestion committee, and he is not in favor of decentralization of the system.

A large mining firm in the Ruhr, spread out over a considerable area, has made the head of the engineering department responsible for reviewing all suggestions. In this way he can judge how good suggestions might be applied in all plants of the firm. Individual plants are invited to share in judging suggestions that affect them.

Most German suggestion committees are made up of at least one representative of management and two of the staff. The other members—from four to 12, depending on the size of the firm—are company experts. This particular composition is laid down by a Federal ordinance providing for tax exemptions and reductions for suggestion systems.

The same ordinance lays down that suggestion awards should be approved by both management and the committee. General feeling in German firms is that the suggestion committee should have the final say on awards.

Filing suggestions — Emphasis is laid in German suggestion systems on helping the inarticulate employee frame his suggestion. Sometimes this help comes from a member of the suggestion committee, sometimes from a member of the technical department.

Anonymity—at least during the assessing period—is the general rule in Germany. The worker writes his name on a counterfoil attached to the suggestion form. This the secretary of the committee tears off after noting the corresponding numbers on form and counterfoil. The purpose of

this is to assure unbiased judgment of suggestions.

Once the suggestions have been reviewed, it is customary in Germany to publish employees' names on the noticeboard or in the works magazine. Opinions vary from company to company as to whether the award should be disclosed.

Awards—These also vary. It is general practice to distinguish between suggestions whose usefulness can be determined and those of a rather intangible value. For the "tangible" ones, the award consists of a certain percentage of the annual savings resulting from the suggestion. (This can vary from 6% to 25%, or even 50%.) ●

In Management

● **"ECS CARNETS" have been issued to several hundred traveling salesmen in Europe.** Issued (for a fee) by cooperating chambers of commerce under an international convention, the passes guarantee customs payments on samples and demonstration models carried by a salesman—if he should sell them. The idea is to make it easier for salesmen to cross frontiers.

The International League for Commercial Travelers and Agents, has set up a similar system, reports the *New York Journal of Commerce.* So far, seven countries have signed the convention.

● **LEO'S LADIES will work alongside males** in the management of electronic data-processing machines, if plans of J. Lyons & Co. are successful. The British manufacturer of Leo Computers wants to hire girls of 18 or so who have studied mathematics and physics, give them extensive courses in electronics and computer engineering. Leo is also interested in women as computer programmers, already has eight on its staff. (*Technology,* Feb. p410)

● **ADRIANO OLIVETTI, office machine maker and management "man of the year"** (MD—Nov.'57, p18), is leading his "Community" movement in Italy's forthcoming elections and standing for Parliament himself. He hopes the movement will capture at least 2% of the popular vote—and dramatize its goals of "free, autonomous Christian socialism" and the "organization of Italian society in a rational and modern way." One goal: A bolder attack on Southern Italy's problems, with agricultural cooperatives and new industry for rural areas.

● **A SEMI-ANNUAL LETTER to the boss pays important dividends** at American Alcolac Corp., a U.S. chemical manufacturer. Every member of the managerial and professional staff is required, twice a year, to write a long, careful letter to his immediate superior, discussing every phase of company activity that affects him. The results—in new ideas and new understanding—are, in Alcolac's words, "little short of startling."

● **A FAMILY GATHERING of licensees** was called in February by Scientific Design Co. The New York engineering firm asked all its licensees—French, Belgian, Japanese, German, U.S.—to meet formally and exchange information on how they are doing with Scientific Design's ethylene oxide process.

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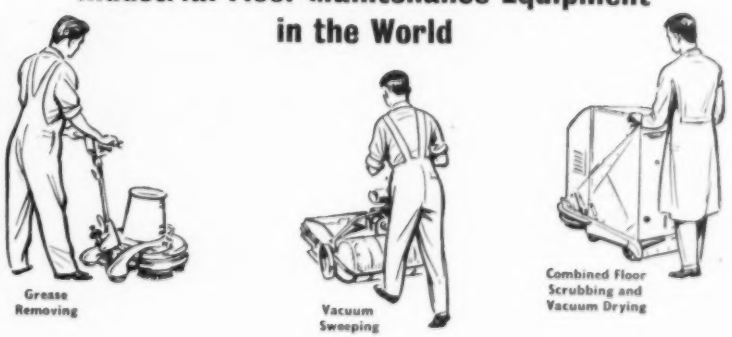

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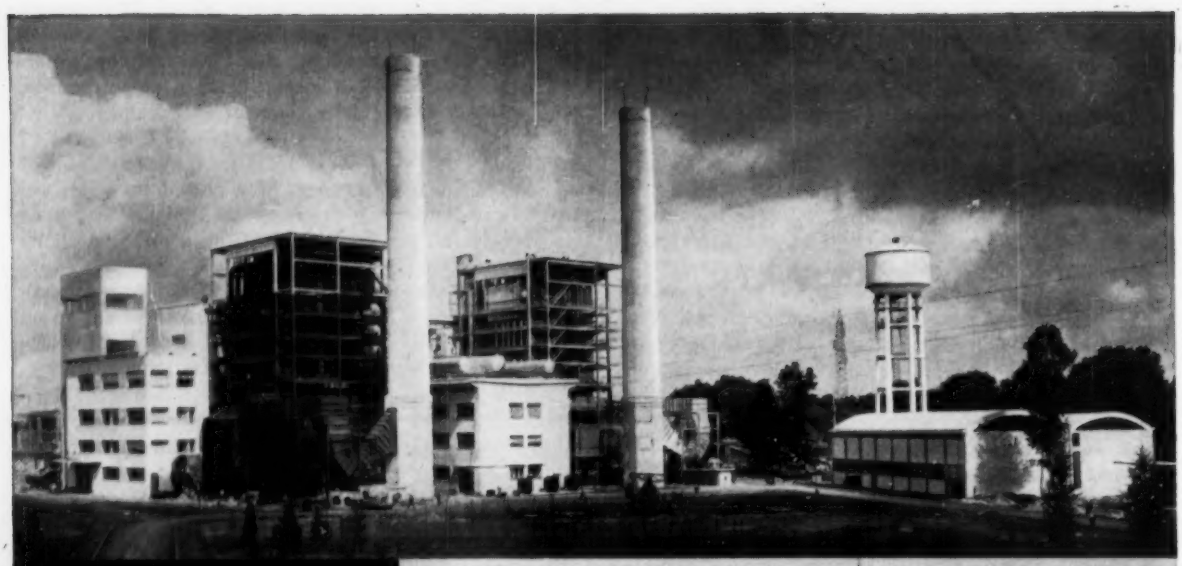

ABOVE: One of Europe's most modern electric power plants, Tavazzano Station near Milano—operated by the Societa Termo Elettrica Italiana. Its two C-E Boilers, burning natural gas, have a maximum continuous capacity of 216 metric tons of steam per hour—to generate 125,000 kilowatts.

RIGHT: A complete C-E Package Boiler for England's Vauxhall Motor Company leaves a London dock. This boiler was shipped completely assembled. Its normal capacity is 10.5 metric tons per hour.

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Japan's Appliances Start a Marketing Revolution

Digested from ELECTRICAL MERCHANDISING, Jan., p264

THIS STORE IN TOKYO (right) illustrates the growth of the appliance market—and the beginning of a marketing revolution—in Japan.

A few years ago, it would have been stocked with small items like electric irons. Today, it is full of refrigerators, washers, electric mixers, television, rice cookers—all made in Japan.

Output has risen sharply. From 1952 to 1957, refrigerator production jumped from 3,500 yearly to 180,000; TV from zero to 550,000. From virtually none in 1950, 12% of urban households now have washing machines; 5%, TV; 2%, refrigerators; 9%, electric mixers.

To be sure, most larger appliances are too expensive for the bulk of Japanese families. A television set costs almost $200; small air conditioners command over $900. (Taxes account for some 30% to 40% of the price.)

Yet higher wages in industry mean fewer domestic servants, and more dependence on appliances. That is why the automatic rice cooker, which saves the housewife fully two hours daily, is expected to be in six million Japanese homes within five years. And that is why the smallest washing machines—at the equivalent of about $65—can be found today in many lower middle class homes.

Another factor in accelerating demand for appliances is the marketing effort of electrical manufacturers and power companies. They have begun to promote appliances heavily through television, radio, newspapers, using fancy showrooms and give-away contests. They are spending about 4% to 5% of their sales income on publicity—a large investment in Japan.

Two major manufacturers have launched time payment—or hire purchase—plans, a major break with tradition in Japanese marketing. Matsushita Electric Co. and Tokyo Shibaura Electric Co. are using wholesaling subsidiaries and several hundred so-called "link" stores that sell exclusively on a credit basis.

Installment selling in Japan is not yet a success. Besides the extra 8% to 10% cost for credit, Japanese object strongly to investigations into their credit standing.

Brand names are a strong selling point in Japan. Customers look for the names of Matsushita, Tokyo Shibaura, Hitachi, Mitsubishi Electric, Sanyo Electric and Fuji Electric, and others. Service guarantees (5 years for refrigerators) put a premium on quality.

While most of Japan's appliances are designed especially for the home market, you can expect to see many more of them exported—especially to Asia and Middle East nations. Meanwhile, Japanese-made transistor radios and tape recorders are already arriving in the U. S. A. and other Western markets. ●

COMPETITIVE TONE is apparent in appliance design, packaging displays.

TODAY'S JAPANESE HOUSEWIFE has more leisure time, fewer servants, and more appliances—automatic rice cooker, electric toaster, refrigerator.

SOLUBLE COFFEE represents one of the important food marketing developments of the past decade. Soluble—or "instant"—coffee now accounts for 30% of coffee consumption in the U. S. A.; elsewhere in the world, its popularity is growing apace. One reason for that growth is Switzerland's Nestle Alimentana, which has spent tremendous sums of money popularizing its "Nescafe" around the world (MD—Feb, p14).

The U. S. A. is now the scene of a keen marketing battle over soluble coffee; dozens of companies are in the field with competitive brands. The coffee producers cannot afford to overlook the slightest detail if they are to win loyal customers.

Consider the case of Nestle U. S. A. and its new "Decaf," a caffein-free instant. With plans for a major sales offensive, the company paused to review marketing strategy—and to make sure that strategy was reflected on the label that will speak for Decaf from a supermarket's shelf.

Decaf's product manager, Edward Taylor, decided the label was out of date. Side panels carried a history of decaffeinated coffee, and detailed instructions for preparation. But the product was already well known: Consumers knew it and how to use it.

There was no longer any need, either, to put "Instant" in such a prominent place on the label. On the grocer's shelf, all brands of instant coffee are grouped together. **The problem is brand identification, and how to catch** the shopper's eye. Impact is reduced if a label does not have design unity (look how the white line cuts through the center panel on the old label above).

To check his judgment, Taylor sent the old label to Color Research Institute, an American consultant organization, which has a rating scale of visibility, readability, etc. The verdict: shelf visibility was good, but not as good as competitive labels.

That wasn't good enough for Taylor. He wanted a label with a striking impact, a strong brand image, and one that suggested top quality (Nestle had recently developed a new processing method that gave a richer coffee flavor).

The design job was turned over to an industrial designer, Egmont Arens. Arens conceived of a label that would speak of coffee, of Decaf Coffee, and the satisfaction of drinking coffee.

Arens and Taylor finally agreed on a cartouche as the focal point of interest. By reducing the side panels (no history, fewer directions), more space was available for the cartouche. It has a shape designed to catch the shoppers eye, and to suggest the aroma of coffee. The cup of coffee at the bottom carries out the theme.

The brand name—Decaf Coffee—is a strong central unit within the cartouche. The printed lettering, a rich coffee-brown color, was selected because Arens noticed that most competitive brands used "reverse" lettering (white on a colored ground) similar to the old Nestle label, and he wanted contrast. Red, a highly visible color, was chosen for the background, and carried onto the cap to make the jar look taller.

To emphasize premium quality, the designer switched from a plain paper wrapper to a foil laminate. He used gold bordering in the design for the same reason.

The new label, when analysed by the color laboratory, outperformed the old label by 14 points on the visibility rating scale.

Readability is slightly less for the new label, but Nestle is happy with a little less readability, a lot more impact. (*Digested from* FOOD ENGINEERING, *Feb, p84*) ●

In Marketing

● **POLYETHYLENE FILM may displace cellophane** as a transparent overwrapping material, the magazine *Modern Packaging* reports. A British cigarette maker, Carreras Ltd., has been marketing 10-pack cartons with a tight, heat-sealed overwrap of 10-mil film for two years. Machine makers are working on improved techniques for wrapping and heat sealing, and a practical "tear-tape".

● **THE STEEL MAKER sells to the manufacturer,** who sells to somebody else who sells to the ultimate consumer. How much steel the steel maker sells depends on how many washing machines or canned beans the consumer buys.

The giant U. S. Steel Corp. turns this logic into action. To help "move" surplus stocks of canned beans from grocers' shelves, U. S. Steel advertised a new receipe for serving green beans—followed up with point-of-purchase displays in grocery stores. A similar consumer campaign helps sell more appliances.

● **COFFEE PRODUCERS** from Latin America and Africa finally got together in Rio de Janeiro, and agreed to raise a joint fund of $9-million (through a levy on bag sales) to encourage the world to drink more coffee. A permanent world headquarters is being set up in Rio to keep an eye on consumption patterns. Large advertising expenditures are planned.

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This sales trainee (seated at left) works as purchasing man for 90 days. When he starts selling, he will understand the view point of . . .

The Man on the Other Side

Digested from CHEMICAL WEEK, Jan.4, p56; Feb.1, p30

MANY COMPANIES give new salesmen a glimpse of the purchasing department, usually a one- or two-day orientation period at most. But few salesmen ever have the chance to understand their traditional "enemy" on the other side of the purchasing desk—what his job is, what his problems are, or the buying techniques he uses.

A sharp break from this pattern has been made by the Organic Chemical Division of the U. S. A.'s Monsanto Chemical Co. The Monsanto sales trainee now spends a full 90 days in the company's purchasing department: He actually interviews salesmen, buys supplies, seeks new sources of supply, obtains competitive bids, does research in purchasing economics.

During the 90 days, the trainee sees more sales techniques than he may see throughout his career.

What the trainee gets out of his purchasing experience is up to him. Monsanto has not tried to measure the results. But as one indication, Monsanto has the strong endorsement of a nine-year Monsanto veteran named George Stewart, who took the "course" in purchasing as an experiment.

During his 90 days, Stewart visited suppliers' plants, studied Monsanto's purchasing and production operations. He interviewed 150 salesmen, purchased more than $100,000 worth of mechanical items, motors, and gears.

Stewart says that about a quarter of the salesmen he interviewed did not know their product; half did not know how to put their product across. Only about 25% had something worthwhile for Monsanto to consider and presented it accordingly. And many of the salesmen failed to leave even a calling card.

Stewart says the training demonstrates four cardinal rules:

—Prepare sales presentations in advance. This forces the salesman to know his products and to discover the best presentation.

—Make appointments. There is tremendous time pressure in the purchasing department. Appointments assure an interview, make the buyer feel his work is respected, and give him a chance to prepare for the sales proposition.

—Use visual aids and demonstrations. Literature and catalogs make it much easier for the buyer to visualize the product, understand the proposition, and reach a conclusion.

—Give the purchasing agent a tangible or written form of the presentation to help him sell the product to plant operating personnel. Stewart was impressed by the "selling job" the purchasing man himself has to do.

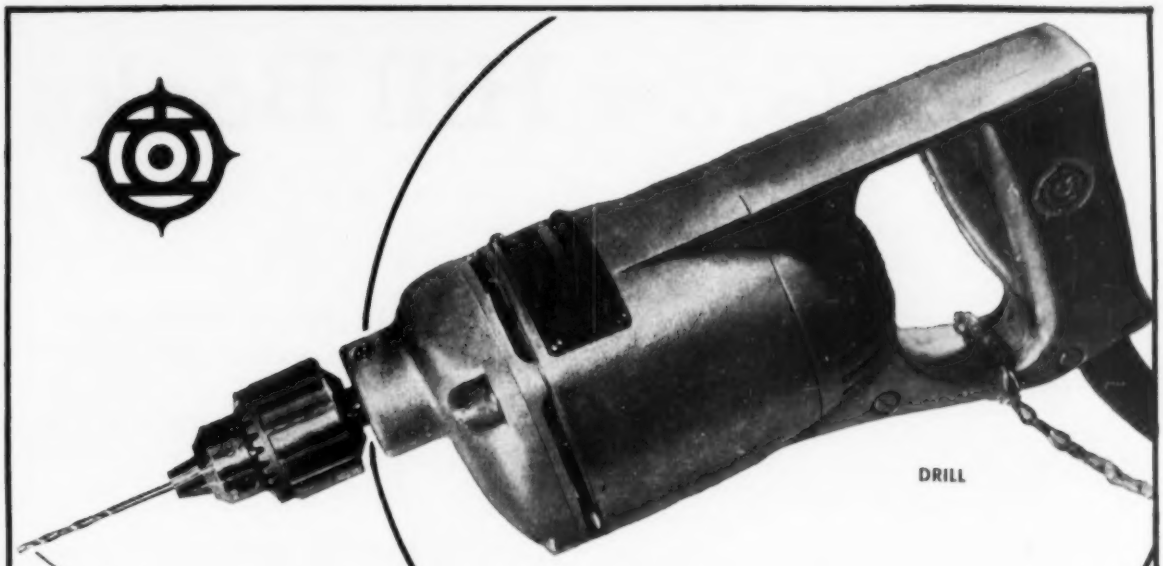
Three months at the purchasing agent's desk also reveals the profit-making potential of purchasing. In some cases, a dollar saved in purchasing equals the profit from $10 in sales. Consequently, a cost-cutting sales approach will get close attention.

The trainees "pay for their keep" by doing special projects. One trainee, for instance, developed a system for buying plant tools on annual contracts, based on standardized specifications.

Before beginning the purchasing stint, trainees go through a basic, 12-week orientation program. Afterwards, they enter a six-month period as assistant sales representatives.

With similar motivations, another U. S. chemical producer—Union Carbide Corp.—brings purchasing men into its classroom training sessions for salesmen. Union Carbide tucks in a four-week classroom course at the midpoint in its two-year training program. The neophyte salesman has been thoroughly grounded in UCC's operations, and a one-year stint as an "inside" salesman in a field office lies ahead.

Having a purchasing agent on hand, explains the training director, "helps familiarize class members with purchasing problems and buyer reactions to various sales approaches." All sales training, he says, is "basically aimed at the purchasing agent." And beside purchasing men, Union Carbide brings in credit men and experienced salesmen. ●



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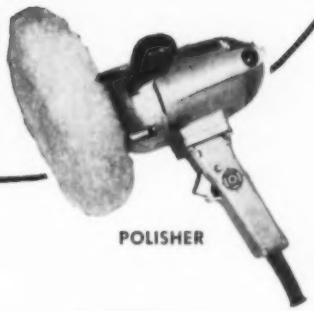

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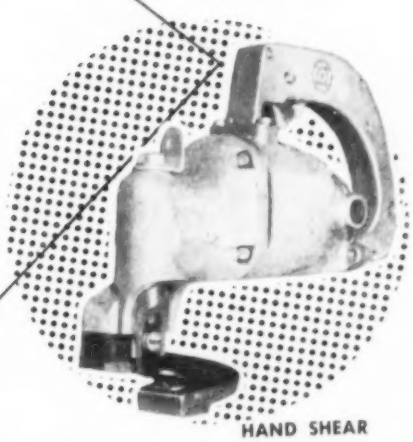

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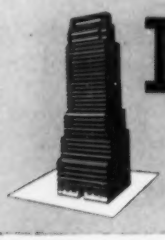

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MODEL enables material-handling engineer and management to get a clear picture of design: ceiling heights, window layout, floor capacities.

Build with a Materials Handling Plan

In building or enlarging a factory, the materials-handling engineer at an early date becomes a key advisor to management.

Digested from AMERICAN MACHINIST, Jan. 13, p118

THE TIME TO WORRY about materials-handling problems is before the first blueprint for a new plant or addition is drawn.

That should be a truism in modern industrial construction. Yet some businessmen forget it—to their later regret. Today, when moving materials can account for as much as 40% of a product's cost (without contributing one pfennig to value), no business can afford to economize in materials-handling planning (MD, Aug.'57,p65).

Planning requires expert advice, and the materials-handling engineer can be worth his weight in gold. Ideally, he should be a combination architect, builder, production man, cost analyst. Only with such a background can he integrate the complex factors that make up an efficient handling system.

The design of a materials-handling system means much more than the handling equipment itself. Site location, building construction, transport, warehousing, production flow are involved; so are parking areas, trucking plazas, railroad facilities, office buildings.

From the time the first shovelful of earth is turned, there must be an integrated plan for the movement of traffic, materials, personnel, work-in-process, and services.

Site Selection

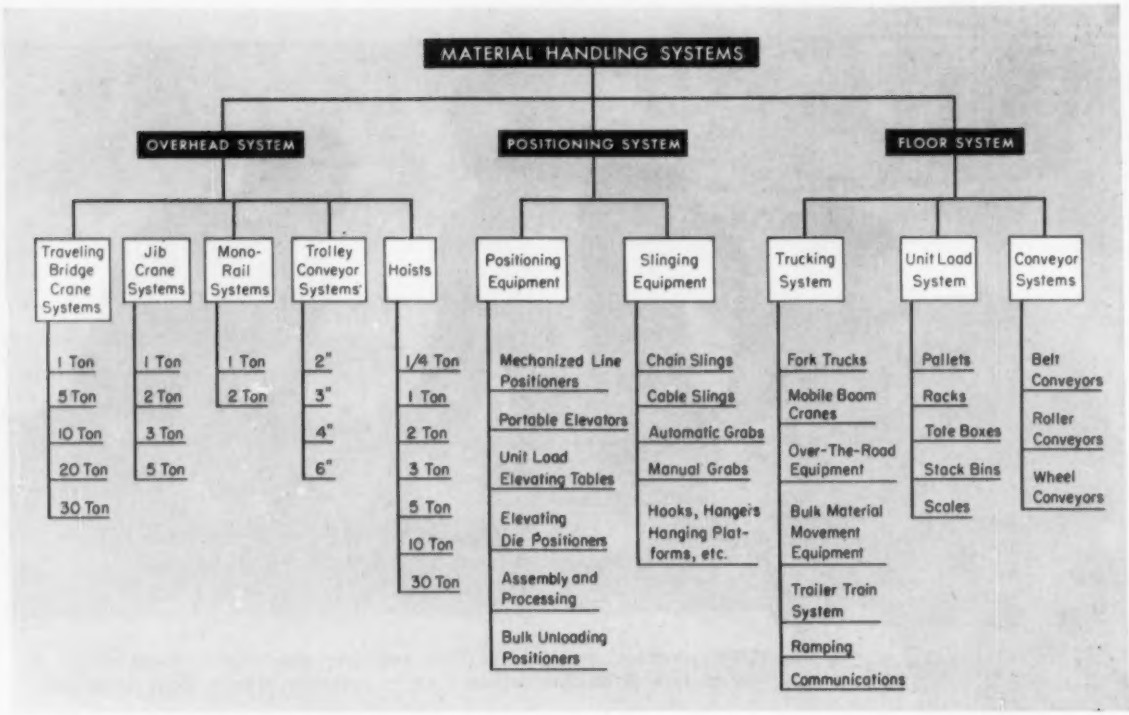
In what areas can the materials-handling ("M-H") engineer contribute to the guidance of management in site selection? His transportation background can be used in reviewing the advantages of railroads, motor trucking, waterways, and roadways in the prospective area.

Another concern will be with the amount of ground and floor space available in various properties. He will study the prevailing construction costs and types of available buildings in the area.

The M-H man certainly will be interested in the available labor. He wants to know what kind of work local people are accustomed to, and what technical training is available in local schools, for their skills may substantially affect the handling of his materials.

Incoming Material

The design of an integrated handling system starts with the raw material back at the supplier's plant. The size and weight of loads that will come to the new plant is important. The M-H engineer must consider the approaches to his company's buildings. If railroad approaches are used, he is interested in layout, switching arrangements, and ground storage space



PLAN for an in-plant materials-handling system breaks down into three parts: overhead, positioning, and floor.

adjacent to tracks and buildings. He must specify industrial trucking and crane facilities for unloading and handling materials.

A task of the M-H man is to eliminate traffic problems involving passenger cars, industrial trucks, and over-the-road trucks on the company's roadways. Here his extensive knowledge of flow, and his intimate knowledge of the roadways over which the material will move to production buildings, enable him to select, size and design a suitable flow pattern.

Another big decision in designing the M-H system is whether to terminate railroad and truck facilities inside or outside the building. This decision involves knowledge of what funds are available, as well as a study of what effects weather and dust will have on products and personnel.

In-Plant Handling

The M-H man's next consideration is product flow, handling, and expediting within the building. As he progresses with the preliminary design of the components of his flow system, he is confronted continually with decisions to be made: changes in methods, product-mix schedules, quantities of materials to remain in storage or processing, and labor requirements.

The M-H man often is more concerned than any other manufacturing man with radio systems for industrial trucks, cranes, and storage centers. In research and laboratory buildings, he can assist in providing the usual monorail, truck, and crane systems, as well as the complex mechanical positioning hands and other special handling devices that are required.

Production Planning

When the plan of a materials-handling system for a manufacturing operation has been accepted by management, equipment components and requirements must be specified. When equipment is selected, consideration must be given to such factors as:

Standardizing the equipment in the buildings; selecting equipment that can be expanded or allocated to all factory areas; reducing equipment dead weight; mechanizing or automating equipment where economical; and making possible the easy identification of the capacity of all equipment.

To obtain equipment usage that will fit his requirements, an M-H man often prefers to break all equipment down into three categories: floor, overhead, and positioning equipment. These groups are subdivided into specific items (see chart above), depending on the specific plant.

To this list of selected equipment are added the following factors required for each item or its proper operation: power, communication, controls, alarms, air conditioning, ventilation, heating, plumbing, sprinklers, and structural support or layout. Here the M-H engineer should also list his estimated future requirements, which will insure expansion of his flow lines unrestricted by inadequate or located services.

The complexities involved in designing a profitable M-H system to suit a building are staggering. This design work is a team job. It can best be coordinated by an MH man of management status who has been trained to look for ways to save money in materials-handling. Maximum returns result when a system is designed that properly integrates all movements of every character to, through, and from the building. ●

"...But why does Euclid make so many sizes and types of off-highway haulers?"

Whether you're moving excavation for highway construction, hauling coal from pit to tipple, hauling logs, or moving earth for a dam, airport or building site, the cost of hauling is a big factor in making a profit. Experience proves that just one or two "universal" machines can't possibly do *all* jobs at the lowest cost... because of varying requirements of capacity, maneuverability, speed, gradeability, etc.

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In addition to Bottom-Dump models, there's a complete range of capacities and power in Euclid Rear-Dumps, Scrapers, and log haulers. That's one of the reasons why Euclids have been the outstanding choice of contractors and industrial users for years.

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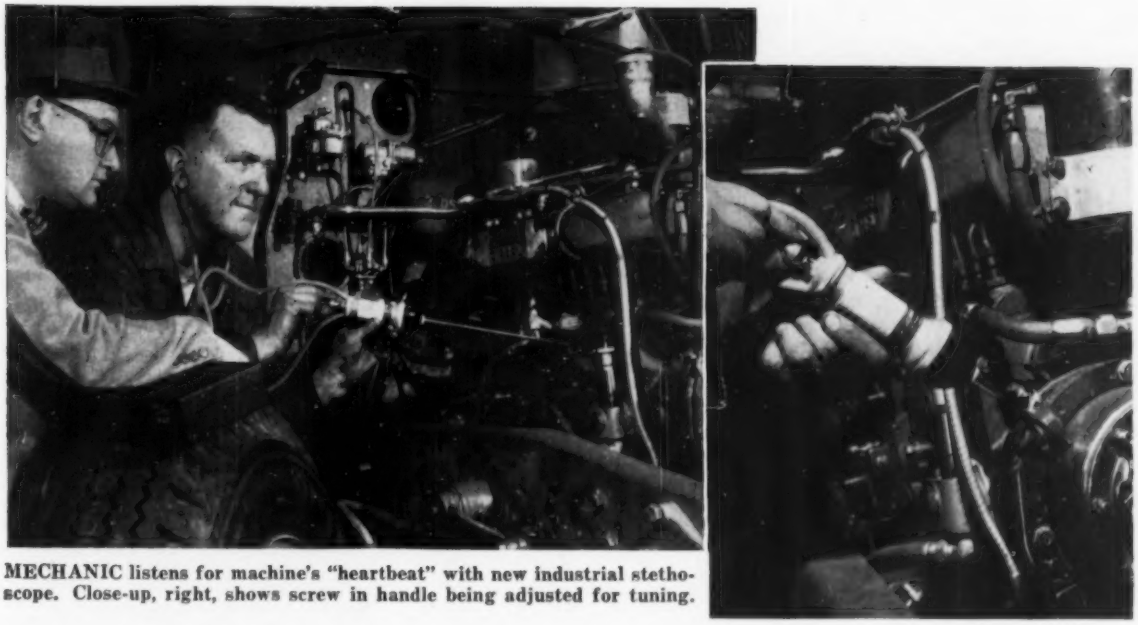


MECHANIC listens for machine's "heartbeat" with new industrial stethoscope. Close-up, right, shows screw in handle being adjusted for tuning.

Tuning in on Engine Trouble

Digested from FLEET OWNER, Feb., p135

USING SOUND as a guide in proper operation of equipment and in trouble-shooting is nothing new in industry. A tin can or telephone receiver mounted on the end of a rod were just improvements over using a screwdriver held to the ear. Now, the standard medical stethoscope has been especially adapted for industrial use, and its effectiveness for maintenance has been greatly increased by making it tuneable.

The device is non-electrical, and has no moving parts. The sounds it picks up are amplified in the chamber in the handle. This chamber is fitted with an adjusting screw which, when turned, changes the frequency within the cavity. In this way some sounds will be amplified while others are suppressed. By making the proper adjustments with this frequency regulator, the operator can eliminate unwanted sounds and clearly pick up those he wants to hear for a particular purpose.

Because the instrument is non-electric and has no diaphragm, it has no fixed frequency of its own, and its manufacturers claim that it can pick up sounds of all frequencies—reproducing them at the desired volume.

Interchangeable probes and horn allow the operator to isolate sounds, knocks, rubs, grinding, taps, vibrations, and leakages of air or gases in bearings, gears, and the like. The stethoscope can be put to work on both gas and diesel engines, on compressors, pumps, piping (to determine leaks), boilers, gear sets, electronic equipment to test for electrical breakdown, switches to check for arcing. It can also check welds and cracks in metal.

When testing electrical connections, the instrument is fitted with a plastic probe. A small needle mounted on the end of the probe can be put on brushes or on the brush caps of a motor. **S. A. Marcol, 62 rue du Lombard, Brussels, Belgium.**

Enter Another New Plastic—Videne

Many unusual properties, among them the ability to adhere and seal without the use of adhesives, are claimed for a new polyester laminating and packaging film called Videne.

A number of industrial companies have successfully tested Videne for various uses like improving the abrasion resistance of aluminum, laminating plywood, and protecting high-impact styrene. The product's abrasion-resistance, in particular, is expected to open new markets for it as film for reinforced plastic truck bodies, boat hulls, construction materials.

Videne is also extremely "stretchable": A sheet of it can be extended 10 times its original size—to a thickness of .0005-inch—thus considerably reducing the initial cost of the polyester product.

An important subsidiary fiber, Videne TC, is being developed from Videne. This is a highly "shrinkable" plastic which will be of special value in the packaging industry. **Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, Ohio, U. S. A.**

Six Kw—from the Wind

A modern windmill—for use in out-of-the-way places—supplies enough electricity for the ordinary light and power requirements of a five-room house. Its electrical output is 6-kw.—providing the wind is blowing at 12 miles per hour.

Storage batteries and a diesel generator provide auxiliary power if wind conditions are unfavorable. In windy locations the wind should be able to supply 90% of the power needed.

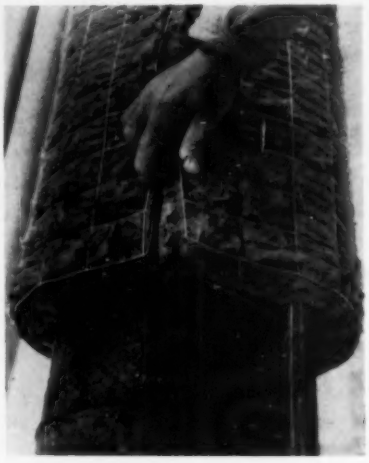
The huge three-blade propeller is equipped with a hydraulic feathering mechanism that keeps it turning at a constant speed regardless of the wind speed.

The total cost of the windmill is expected to run between $14,000 and $16,000, a power cost of about 25¢ per kwh. This may seem expensive, but not if the alternative is running a power line over rough terrain or installing a diesel generator and trucking in fuel and maintenance personnel periodically. **Automic Power Inc., Houston, Texas, U.S.A.**

Paint Resists Sand, Water, Heat

"Sand-blasting" by a 140-mile-per-hour hurricane failed to damage the exterior of a concrete block house that had been coated with WC-130, a new vinyl acetate resin latex. After six months, the paint still looked as good as new.

The paint is easily applied by brush roller or spray, and forms a well-knit film in a few hours. WC-130 resin paints, says the manufacturer, have light and heat stability, resistance to water, freedom from graininess, are quick-drying and resistant to foaming. Blistering is no problem because of the excellent moisture-vapor transmitting properties of the resin. **Union Carbide International Co., 30 East 42nd Street, New York 17, N. Y., U.S.A.**



Insulation Has Built-In Fasteners

This "No. 101" pipe insulation—for nested pipes and steam-traced lines—consists of moisture-resistant spun mineral wool that will withstand temperatures to 1,200°F. Its surface is faced with a metal fabric of 16-gage wires welded in a rectangular mesh and held in place by wires tied through the spun wool to an inner facing of 1-inch expanded metal lath.

Hooking the wires that extend from one end of the outer mesh fabric under the opposite stay wire and bending them back makes for rapid installation.

The new material is specifically designed for runs of pipe that are to be weatherproofed with sheet metal or roofing felt, and is available in 2 ft. sections, 1½ to 4 inches thick for pipe sizes ranging from 4 to 30 inches in diameter. **Baldwin-Hill Company, 500 Breunig Avenue, Trenton, New Jersey, U.S.A.**

PROBLEM:

Fast stacking of bales in limited space area

SOLUTION:

Yale Industrial Lift Trucks

Yale Petrol Truck stacking bales

From Rome to Rio – Bangkok to Birmingham – you will find busy Yale Industrial Trucks at work easing burdens, speeding goods to market, stacking goods in warehouses. You will find that Yale Trucks are equally useful at handling crates, bales, coils, drums or other packages. And you will discover that the savings in time and operating costs achieved by these speedy, economical trucks make them an investment that will increase profits for years.

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Complete Sewage Treatment Plant

The "CompleTreator" is a 2-stage trickling filter plant whose main applications will be in housing developments, restaurants, service stations, schools, and in industry for disposing of domestic-type wastes.

The principle on which the "CompleTreator" works is not new, but its chief advantage is that it incorporates in a single unit what normally requires 5 separate tanks in large-scale installations. The plant also needs the minimum of operating attendance.

The unit will handle wastes of up to 150 persons or their equivalent in biochemical oxygen demand loading. The picture shows the steel tank—11½ feet in diameter, 20 feet high—that contains the plant. **Dorr-Oliver Inc., Barry Place, Stamford, Connecticut, U. S. A.**

Hanging Scaffold

A new scaffolding, adaptable for all buildings, hangs directly from the wall instead of having to be built up to the spot where work is to be done. It can be used for all maintenance work, from small jobs to work involving the entire face of the building, without interference from traffic below. The brackets that hold the scaffold are attached to sockets fixed permanently to the wall. **Arnold Building Bracket Co., 47 Hillcroft Crescent, Ealing, London W. 5, England.**

Industrial Sewing Machine

The RZI heavy-duty industrial sewing machine incorporates such features as zig-zag, forward and reverse, and fancy decorative stitching. Seven modified models of the RZI are available for a wide range of special purposes, from fabric and leather double-needle pleating, and ornamental ridging, to sewing tubular belts. **Necchi SPA, Pavia, Italy.**

Bag Tubing

A new bag tubing machine produces many kinds of printed tubes for cement, flour, sugar, fertilizers

CLEVELANDS dig, fill and compact trenches of all types:

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DIGGING IN HARD ROCK this Cleveland Model 240 is carving out trench at a good steady pace for a small petroleum pipeline in rugged Rocky Mountain terrain in the U.S.A. Dependable, low-cost production is only one of many reasons why Clevelands are used on all types of trenching jobs throughout the world.

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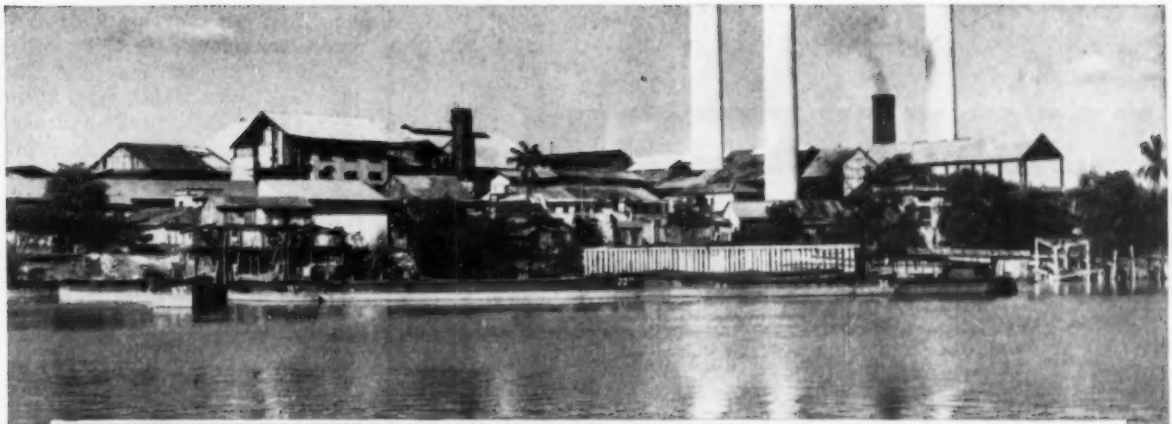
The CLEVELAND TRENCHER Co. 20100 St. Clair Avenue, Cleveland 17, Ohio



How LINK-BELT sugar handling equipment helps make this

the world's most productive cane sugar mill

San Cristobal mill produces 1430 tons of refined sugar per day and utilizes Link-Belt processing, conveying and power transmission machinery

With its production of 1430 tons of refined sugar a day, Ingenio de San Cristobal y Anexas, S.A., in Veracruz, Mexico, is the world's largest refined cane sugar mill. Link-Belt handling equipment—Roto-Louvre granulators, oscillating conveyors, liquid screens, car dumpers, cane conveyors, bagasse carriers—assure low per-ton handling costs and high tonnage production.

Link-Belt offers a complete line of machinery designed to effect savings in time and costs of handling materials and transmitting power. This includes belt, screw conveyors, bucket elevators, bearings, chains, speed reducers and related equipment. For complete details on the benefits of such one-source service, contact your Link-Belt representative or write direct. 14.628

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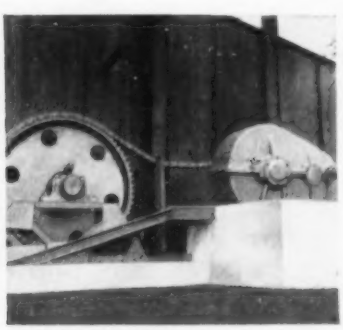
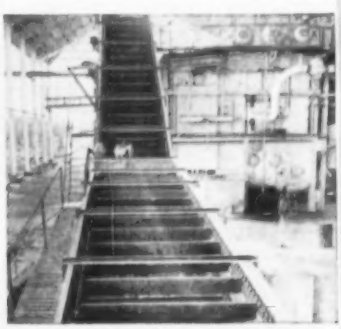


POWER TRANSMISSION PRODUCTS—Link-Belt parallel shaft drive, roller chain and bearings deliver power to cane carrier in early stage of sugar production.



BAGASSE CONVEYOR AND ELEVATOR with Link-Belt chains and slats economically carry bagasse to storage or boilers. Close-fitting chain joints keep out dirt and grit.

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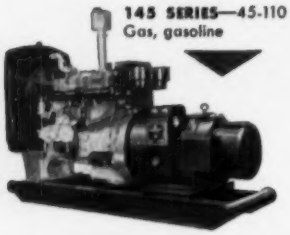

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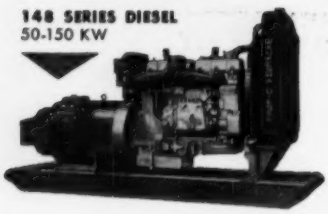

WAKD SERIES DIESEL
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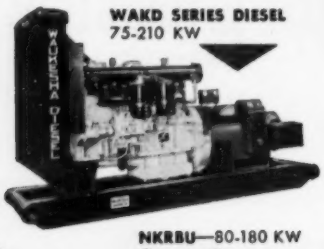
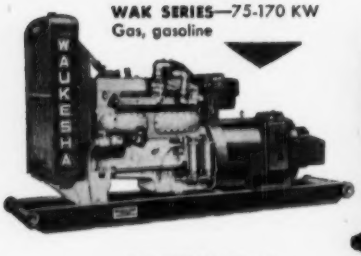
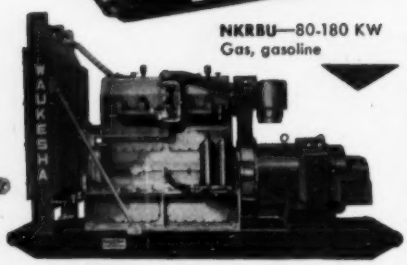


WAK SERIES—75-170 KW
Gas, gasoline



NKRBU—80-180 KW
Gas, gasoline



LRD SERIES DIESEL
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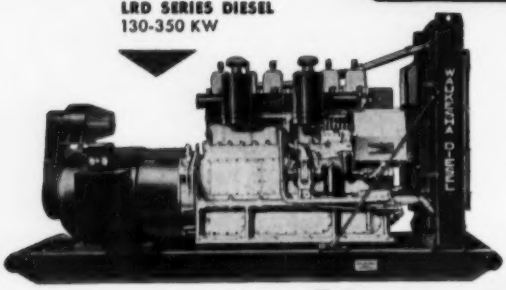

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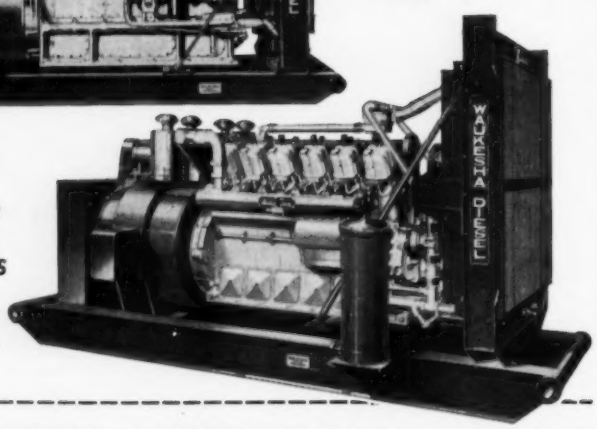

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etc. from rolls of kraft or tarpaulin-laminated paper.

Width of the roll may be up to 48 inches; tube length from 20 to 38 inches, width 12.5 to 28.5 inches. The machine is designed to print up to 4 colors. **Cho Sewing Machine Co., Ltd., 137, Nicho-machi, Daito-ku, Tokyo, Japan.**

Powder-Driven Fastening Made Safe

This powder-actuated tool (MD, March, p46) has a control device that automatically stops an overdriven fastener in its tracks and avoids the danger of firing through a thin work surface—without damaging the tool or slowing down its work.

The "Flite-Check" sets more than 150 fasteners an hour, and is capable of sinking a fastener into steel 1 inch thick. Its chief jobs will be fastening electrical fixtures, partition plates, ducts, plumbing lines, and machinery mounts. **Ramset Fastening System, Cleveland, Ohio, U. S. A.**

Bill Receipting Machine

A new electric machine records receipt of payment on postcard-type bills that are used with punch card tabulating systems. The "Model 225 Receiptor", as the unit is called, automatically does the following: (1) perforates customer's receipt with Paid, Date, Location Number, Company Initials and Teller Number; (2) prints stub with Date and Teller Number; (3) detaches stub from receipt—"all in the space of a second." **Heller Roberts Mfg. Corp., American Perforator Div., 700 Jamaica Ave., Brooklyn 8, New York, U. S. A.**

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Artwork Quickly Traced to Size

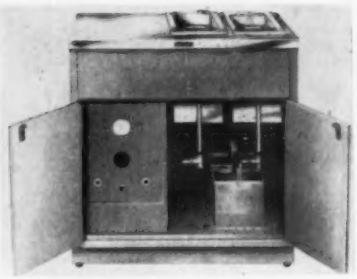
With the "Model C Director Projector" an artist or engineer can project his drawings or tracings directly on to heavy illustration board and in true color, according to the manufacturers. In this way he can quickly work on the finished artwork on heavy board.

No darkroom is necessary. A grey vinyl hood surrounds the 23 × 31-inch drawing board, as well as the designer and his chair.

The unit can be moved from place to place as required. **M. P. Goodkin Co., 24 Beach St., Newark 2, New Jersey, U. S. A.**

Paper That Stretches Practical and Economical

A newly-invented "stretchable" paper, called "Kraftsman Clupak", may have far-reaching effects on the U. S. paper industry. There are many obvious applications for the product—stronger and lighter paper bags and sacks, corrosion-proof engine-part wrappings, moisture-resistant containers. But the economies inherent in the paper are likely to be still more important than its uses. As Clupak has up to 20% more stretch than regular kraft paper, it is tougher and less of it is required on any given job. **West Virginia Pulp & Paper Co., Charleston, South Carolina, U. S. A.**



Sound "Bath" for Precision Parts

Mechanical parts, bearing assemblies, and delicate mechanisms can have an ultrasonic "bath" in this cleaner, which is built like a cabinet and has a stainless steel working top. Either one tank can be supplied — for cleaning — or two tanks—one for cleaning and one for rinsing. Stainless steel work baskets are also available.

The tanks are 6½ inches wide by 16 inches long and 10 inches deep. Average output of the power generator is 250 watts. **Labline Inc., 3070-82 W. Grand Ave., Chicago 22, Illinois, U. S. A.**

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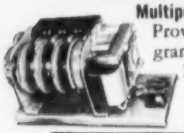
Multiflex Reset Timer—For sequence operation of several circuits—each adjustable.

Flexopulse Repeat Cycle Timer—ON-OFF time independently adjustable on calibrated scale.



Multipulse Repeat Cycle Timer Provides sequential or programmed operation of 2 to 12 circuits.

Microflex Reset Counter—Trips switches open or closed after preset number of counts. Electric reset.

Represented above are but a few of the complete line of popular EAGLE Industrial Timers and Counters.

Models are available in a wide range of modifications to fit your particular application. Modern compact design and precise construction of these EAGLE components has won them an enviable world-wide reputation for accuracy and long service-free life of operation. Write us about your needs.

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- Eliminate shipping delays
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- Designed for your own local operating conditions

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THE CONSUL

The Zodiac, the Zephyr, the Consul . . . each a leader in its own class. Take a look at automatic transmission too, on the Zephyr and Zodiac . . . it's truly two pedal driving.

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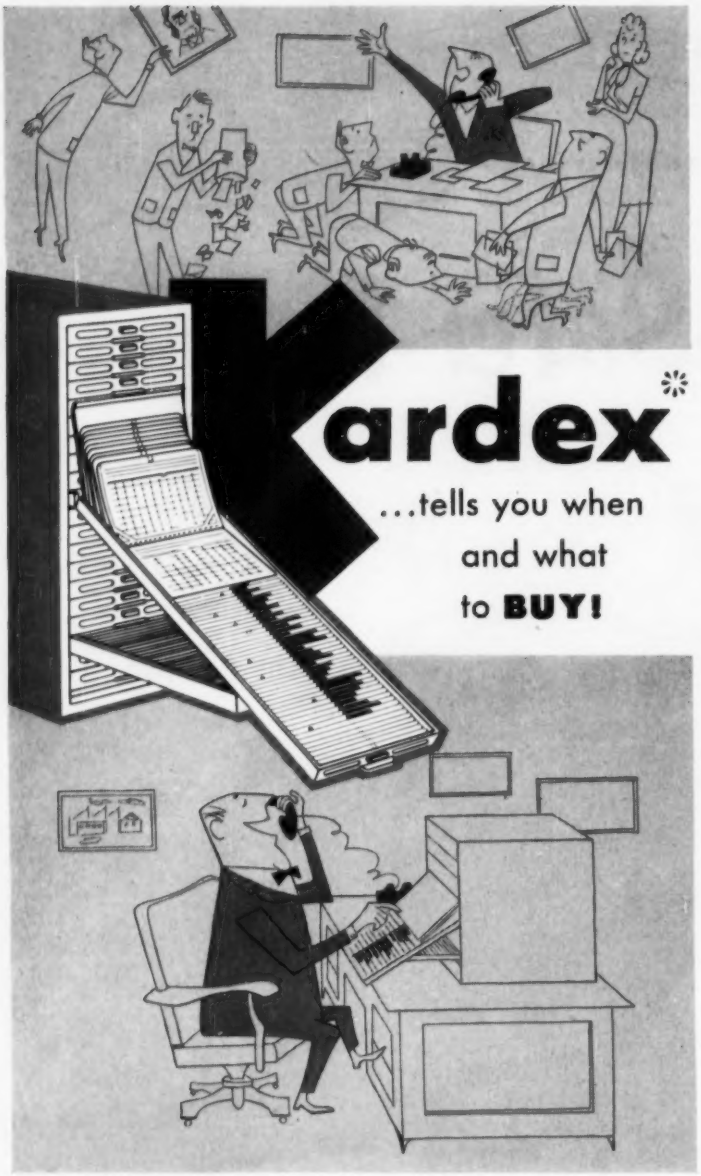
Long, low, wide . . . room for six in luxurious comfort . . . brilliantly styled . . . sweeping lines, perfectly proportioned. Exciting performance . . . 'over-square' motor . . . larger capacity, lower revs . . . extra "punch" for a faster get-away. More space, more style . . . the 'Three Graces' from England are at your Dealer's now. Ask for a demonstration.

MOTOR COMPANY LIMITED

. . . and World-Wide Service too!



MANAGEMENT BY KARDEX VISIBLE CONTROL gives you a running summary of balances on hand . . . keeps you posted on orders, follow-ups, deliveries . . . charts specifications, costs, terms and suppliers for instant reference. No more wild guesswork . . . no more frantic hunting for buried facts. Kardex converts even the most complex purchasing operation to automatic routine.

There are 18,000 Remington Rand Branches and Distributors throughout the world—see your telephone directory for your local representative.

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Remington Rand International

DIVISION OF SPERRY RAND CORPORATION

Midget Recorder

A midget recording unit has been developed for use with magnetic striped film and a motion picture camera. It enables the cameraman to record directly onto film while shooting is in progress.

The unit, weighing three pounds, is strapped around the operator's waist. By means of a separate magnetic head in the sound adaption, the recorded sound can be heard on high quality headphones within 1/24th of second, thereby facilitating monitoring. **Rank Precision Industries, Ltd., Mortimer Street, London W. 1, England.**

Interlocking Drums

The Uni-Drum container—a new 55 gal. steel drum which interlocks with adjacent containers—saves space and reduces handling and shipping costs.

The rolling hoops are slightly offset—alternately raised and lowered—on opposite sides of the drum. When unitized, a group of drums can be handled by a standard lift truck without the use of costly wood pallets. **Vulcan Containers Inc., P. O. Box 161, Bellwood, Illinois, U. S. A.**

Molds Concrete Pipes

The new "VR 600" vibratory finisher produces circular concrete pipes with an internal diameter of up to 24 inches, oval pipes up to 20-30 inches, and any other hollow tubes up to maximum diameter of 40 inches. Four 12-inch (internal diameter) pipes can be molded at the same time. **Schlosser & Co. GmbH, Michelbacher Huette, Michelbach/Nassau, West Germany.**

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Known Throughout the World for Quality

The most diversified line of steels and steel products made by any steelmaker in the world—products which are recognized today for their faithful service—products which are conveniently available to you through competent representatives located in major cities throughout the world.

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Alloy, Carbon and ENDURO* Stainless Steels
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Boiler and Heat Exchanger Tubes
Mechanical Tubing
Conduit
Tin Plate
Terne Plate
Bolts, Nuts and Rivets
Wire Rods, Nails and Staples
Fence and Fence Posts
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Steel Building Products
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Shelving
Steel Cabinets for Kitchens
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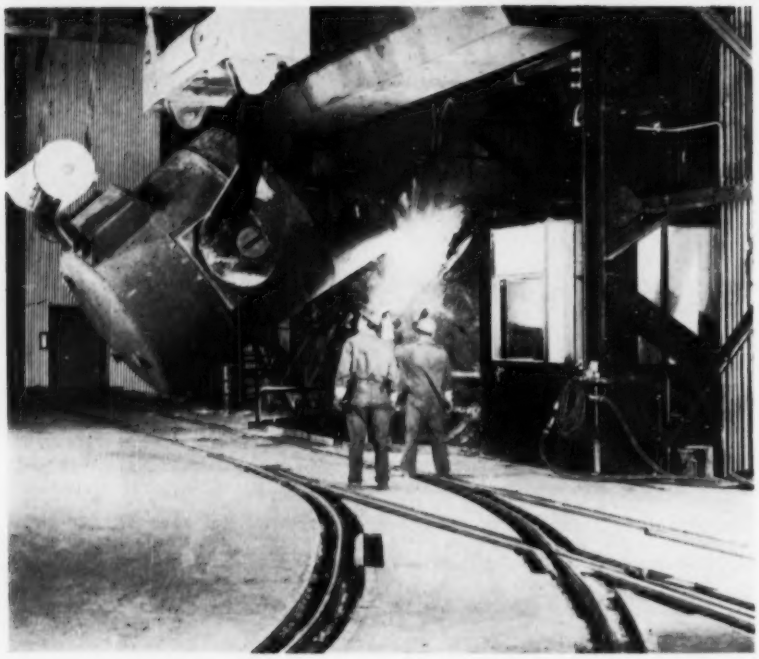
Looking Ahead in Technology



● **OXYGEN FURNACES such as those installed at the Aliquippa Works** (photo above) of U. S. A.'s Jones & Laughlin Steel Corp. may go a long way towards reducing the huge capital investment normally required for making high-quality steel. Capital outlay for two new furnaces amounted to only $15 per annual ingot ton of metal, compared with the $40 now spent for new open hearth furnaces. Using the basic oxygen process, the cylindrical furnaces are charged with scrap, molten iron, and slag-forming materials. Only one furnace works at a time. While one makes steel, the other is relined with refractory material. (*Factory Management & Maintenance, Feb., p* 114)

● **REINFORCED PLASTICS are becoming a major structural material** in Europe and the U. S. A. They are going into car and truck bodies, wall panels, furniture, and boats (MD, Mar., p 45). Plastics often have a competitive edge on metals. They also are lightweight, free from corrosion and denting, capable of being formed into attractive complex-shaped final products in a single operation. Scientists are improving both the fibers and resins that go into making reinforced plastics. (*Purchasing Week, Feb.* 17, *p* 20)

● **MAGNETS have replaced mechanical holding fixtures** on one U. S. production line. General Electric Co. uses them for moving tool parts through a paint bath. The parts hang from an overhead conveyor on 400 horseshoe magnets—with like poles next to each other to prevent mutual attraction. As the line moves, the parts dip into a paint tank and then pass through a blast of compressed air and a circulating air chamber. Parts are removed by hand, and the conveyor and magnets move through a hot alkaline cleaning solution and hot water rinse bath. (*American Machinist, Feb.* 10, *p* 141)

● **PLASTICS made from sugar** have moved into pilot production at an American cane plantation, Valentine Sugars, Inc. The firm is using the process developed by Sugar Research Foundation (MD, Dec. '55, p 22; Nov. '57, p 36) to make pale amber resins from sugar. A wide range of uses—from adhesives to molding compounds—are being evaluated. (*Product Engineering, Feb.* 24, *p* 7)

● **GROWING TREES are being dyed experimentally in Russia** for special lumber effects. Trees are treated for five to ten days with various solutions. Beech treated with ferrous sulfate takes on a steel color; treated with cupric chloride, it takes on a pearly sheen. A similar process was tried out in the U. S. A. some years ago, but did not prove successful. Studies along the same lines also have been reported in Germany. (*Chemical Week, Feb.* 8, *p* 71)

● **TRANSPARENT FILM of linear polyethylene**—a potential competitor for cellophane in packaging food, cigarettes—recently has been developed by two U. S. firms. Marlex 50 film (shown below) comes out of the laboratories of Phillips Chemical Co., while a similar product known as Grex film has been researched by W. R. Grace & Co. (page 22). The new film, represents a technical triumph: Until recently, film made from linear polyethylene was opaque or hazy, limiting its use in packaging. Questions remaining to be solved include

1) How fast can the new films be processed on existing packaging machinery and 2) What is their resistance to impact? Meanwhile, other researchers are working on a tough and low-cost polypropylene film—that may be available before the newcomers have had a chance

More power... more pull... on and off the road

NEW 4-WHEEL-DRIVE TRUCKS

BY CHRYSLER CORPORATION

● Meet sand, mud, steep off-road climbs head on. Take the ruggedest routes with dependable ease in your choice of the most powerful four-wheel-drive trucks ever offered in their weight class. New Dodge, De Soto and Fargo four-wheel-drive models combine all the features of a conventional two-wheel-drive truck for on-road operations *plus* the extra advantage of four-wheel-drive traction when you need it.

You get new styling, with dramatic dual headlights standard. New safety-designed cabs, with full wrap-around windshields. New payload capacities that let you haul more each trip.

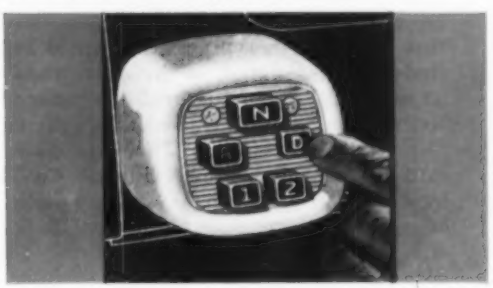
And for the greatest driving convenience ever, push-button LoadFlite automatic transmission is now available on all W100, W200 and W300 models.

So if your hauling jobs call for both on- and off-road operations, these are the trucks for you . . . the new Dodge, De Soto and Fargo four-wheel-drives for '58. See them now.

MORE POWER! Up to 204 V-8 horsepower, combined with exclusive Power-Dome design, gives you peak performance on regular gas. Three thrifty Sixes are also available.

MORE PULL! Full four-wheel-drive traction makes off-road operations easy. For normal highway driving, switch to conventional two-wheel-drive with a quick flick of a lever.

MORE MODELS THAN EVER! A complete choice of conventional body styles, a chassis-cab, chassis-cowl, or the famous military-type Power-Wagon (W-300M) are now available. G.V.W.'s range from 5,100 lbs. to 20,000 lbs.



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MoPar — Always insist on MoPar replacement parts for your Dodge, De Soto or Fargo Truck

DRIVE THEM NOW AT YOUR

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to find their place in the commercial market. (*Chemical Week, Feb.* 1, *p* 75)

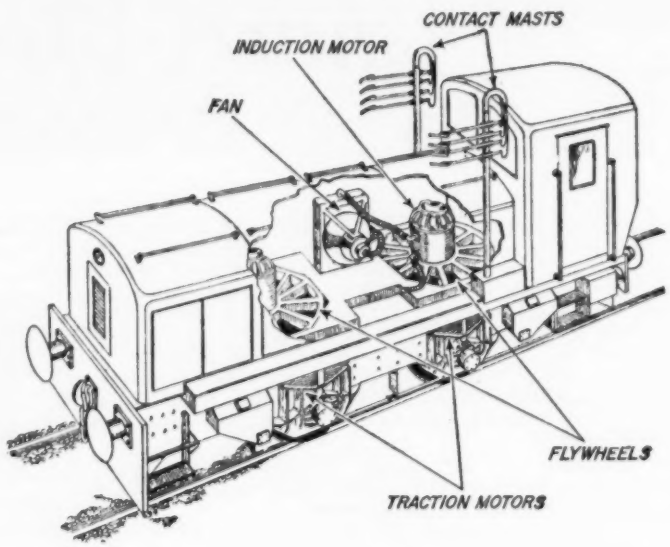
● **ALUMINUM that can withstand temperatures of 550 C** for long periods without losing strength has been developed by German scientists using new sintered powder techniques. The parts made by the process can be machined and finished like ordinary aluminum. Welding the material requires special precautions, so as not to destroy the structure responsible for the material's properties. (*Metalworking Porduction, Jan.* 24, *p* 5)

● **LEATHER PROPERTIES now can be accurately gaged** by a machine developed by T. J. Carter, of the U. S. A.'s National Bureau of Standards. The device tests the strength, stretch, and "crackiness" of leathers by delivering repeated thrusts on both sides of a specimen until failure.

● **TECHNICAL LITERATURE is the handmaiden of industrial progress,** but only if it can be stored properly and retrieved when needed. Industrial writings are increasing at a geometric rate. The publication *Chemical Abstracts,* for example, expects its new Decennial Index to take nineteen 1200-page volumes, three volumes more than the combined total of the last three Decennial Indexes.

How to keep this valuable information on tap is the problem being faced by companies everywhere. The National Science Foundation soon will publish a report on how 25 American firms are handling their technical literature. Some companies are setting up special information divisions, hiring highly technical men for key library jobs. Other firms are putting more stress on improved tools for filing, indexing, and coding the information that must be made available. In use are cross-reference coding systems that use key words, proper names, trademarks—designed to indicate an easy road to stored information. Key words are typed on index cards, then filed alphabetically. Punched cards and computers are being used by some firms to speed up the work of patent and literature searchers. (*Chemical Engineering, Feb.* 10, *p* 84)

● **AN EXPANSION JOINT made of synthetic rubber** is being tested in the U. S. A. for bonding road and air-runway sections together. The rubber joint—about 33 centimeters wide and extending across a roadway (photo above)—is aimed at eliminating the rhythmic shock motorists feel on concrete highways under varied weather conditions. It also can insure smoother landings for aircraft. Metal plates in the rubber carry the vertical loads of the traffic.



● **FLYWHEELS that store and then release energy** are being tested for powering locomotives in Britain. A small mining locomotive under study by Britain's National Coal Board—using the same principle that moves a child's "push and go" toy—can run for 30 minutes at a speed of 24 kilometers per hour, from kinetic energy stored in the spin of two flywheels. The locomotive is charged when stationary through contact masts that pick up electricity for two induction motors (see drawing), which set the flywheels spinning at a speed of 3,000 rpm. Charging takes 2½ minutes, by which time the equivalent of 18 kilowatt-hours are stored. (*The Economist, Feb.* 1, *p* 432)

Coiled material is unloaded and stored by this ram-equipped, 6,000-lb (2730 kg) Allis-Chalmers fork lift truck.

Pallet load of bolts is picked up by 4,000-lb (1840 kg) Allis-Chalmers truck and carried, through narrow aisles, to heat-treat department.

THESE ALLIS-CHALMERS LIFT TRUCKS Reduced Costs at Metal-Working Plant

Finished bolts are being stacked on dock by 4,000-lb (1840 kg) Allis-Chalmers lift truck, preparatory to shipment.

Substantial cost reductions were realized when three Allis-Chalmers fork lift trucks replaced other power trucks, hand trucks and manual handling at a large metal-working factory, with these typical savings:

Faster unloading—unloading coils of material formerly took several men up to two hours — now *one* man on a ram-equipped fork truck does it in an hour or less.

Workmen released for other work—two of the four men previously required in the raw material department have been released for other work.

Volume increased, costs decreased — the three Allis-Chalmers trucks, and the palletized handling and storage methods they made possible, have effected savings of several thousand dollars annually, *with a 40-percent increase in tonnages handled!*

Truck maintenance reduced — the cost of maintaining Allis-Chalmers lift trucks is nearly one-third less than with the lift trucks previously used — and they are back in service sooner.

Safer working conditions— with fewer men involved in handling materials, there is less danger of accidents. Handling with Allis-Chalmers fork trucks has proved to be safer than other handling methods.

Trucks work 18 hours daily, 5 days a week

The three Allis-Chalmers trucks are on the go 18 hours per day, 5 to 6 days per week. Being in continuous service, their ability to stay on the job is especially important.

Let your Allis-Chalmers material handling dealer show you how you can reduce costs in your own plant with these modern lift trucks. Write for full information.

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BHE-16

An enormous quantity of radioactive isotopes will be available from new atomic power plants.

New techniques are making the isotope an industrial processing tool as well as a control instrument.

Isotopes Head for Wider Horizons

IN ELEVEN YEARS, radioactive materials have become a profitable tool in practically every corner of the world. Outside of the U. S. A., the primary use to date has been in medical diagnosis and treatment. But industrial application in Britain, France, and other European countries has been growing fast—serving everything from paper processing to the ventilation of mines.

U. S. industry has been a pioneer in the field because of the availability of radioisotopes from its research atomic reactors. Since 1946 the U. S. Atomic Energy Commission has made over 90,000 shipments of isotopes, including some 5,000 shipments to 57 different foreign countries. In these 11 years the number of American companies using these radioactive chemicals has increased from 18 to about 1800.

The important news in isotopes, however, is not solely in the effect they have had on American industry, nor in the rapid strides being made by British firms. Two factors underline isotopes' promise for the future: First is the fact that radioactive materials soon will be plentiful everywhere; second, the strides being made in finding new jobs for isotopes in a wide range of industries. From its first applications as a tracer or gager, the isotope appears likely to become a major chemical processing tool, a package checker, a long-life battery, a preservative, and a sterilizing agent.

Radioisotopes will be available everywhere tomorrow because nuclear reactors are being built everywhere. Nuclear power programs are underway in over 30 countries, and at least 13 of these already have reactors burning uranium. Besides Britain, the U. S. A., and Russia, significant programs are underway in France, Sweden, Czechoslovakia, West Germany, Japan, India. Elsewhere, small research reactors are being set up.

A major by-product of these reactors will be radioactive elements. Today three methods are used for producing isotopes. In order of importance they are: 1) bombardment of targets in nuclear reactors; 2) spent fuel elements from reactors; and 3) bombardment of targets in accelerators.

All have a position in tomorrow's production of isotopes. Bombardment in accelerators, an early method of obtaining radioisotopes, will be used for making elements that can not be readily concentrated by other methods. Target bombardment in reactors will also yield many specialized isotopes. But the main source will be the by-products from nuclear power developments: components of spent fuel elements that come from the fission of uranium.

Generation of atomic electricity will mean the production of enormous amounts of radioactive fission products. By 1965 Britain will be producing at least 3.5 tons of fission products a year as a by-product of making atomic electricity. The radioactivity of these products will be equivalent to a thousand million grams of radium. Larger amounts will be available in Britain and other countries later.

How will countries use these huge quantities of radioactive materials? Much will be used in medicine—the treatment of malignant tissues, radiography, the study of body processes. Other large quantities will aid agriculture.

But the biggest role for isotopes will be as production aids in industry, which today already are saving American firms an estimated $500-million a year, and other countries close to $300-million. These tools will serve in three basic fields: 1) As tracers and gages—"super-detectives" for monitoring and controlling a wide variety of industrial operations; 2) in place of X-ray machines, as cameras for spotting machinery faults and wear; and 3) as catalysts or active agents in creating and modifying materials.

I. As a Detective

The most publicized use of isotopes in industry has been as tracers and gages—instruments for detecting anything from the thickness of steel as it is milled to the contents of packages. Isotopes are valuable as monitors because they emit rays that can pass through a material or process line and then be picked up and measured by an instrument such as a Geiger counter.

You can see an impressive example of this in the thickness gages today being used in Europe and the U. S. A. As white-hot steel sheet passes along a conveyor at something like 70 meters per minute, its thickness is gaged to an accuracy of 1% by gamma rays emitted on one side and picked up on the other side by a detector. The degree to which the steel absorbs the rays tells the story of its thickness.

Variations of such systems today are used to gage the firmness of cigarettes, the thickness of paper, rubber, and plastics. A

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DRIVING a car used to be work. Now it's all pleasure because you get there without trouble. This is Better-ness. And Timken made-in-U.S.A. bearings help you *get* it.

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THIS IS BETTER-ness . . .
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TAPERED ROLLER BEARINGS

coating thickness often is measured by reflected radiation. The rays pass through the coating and are reflected by the supporting material back through the coating. Double passage through the coating product provides an even more sensitive measurement.

The British have been working on radioactive monitors for checking the contents of all kinds of packages, cans, and collapsible tubes. The can or tube passes between a radioactive source and a detector. A deficiency in contents registers on the detector, a warning buzzer sounds, or the package is ejected. The system allows for far faster inspection than check-weighing, and lends itself readily to automatic control.

Isotopes also act as flow tracers for detecting leaks in buried or inaccessible equipment. In a typical case, a leak was suspected in the copper tubing of a heating system buried in the concrete floor of a factory. A small amount of a radioisotope — iodine-131 — was added to the water of the heating system. A Geiger counter quickly located the increased radioactivity at the leak; the break was repaired by removing a section of flooring only 15 centimeters in diameter.

II. As a Camera

Radioactive isotopes have been replacing radium and X-ray machines for inspecting castings and finished products for voids and cavities. Some 500 firms today are using such isotopes as cobalt-60, cesium-137, and iridium-192 in radiographic testing of lead, steel, and iron castings. A cobalt-60 source provides rays comparable to a million-volt X-ray machine costing about $100,000.

The procedure with isotopes is similar to the techniques that have been used with X-ray machines for many years. A radiation source is placed on one side of the material to be tested, and photographic film on the other. After a suitable exposure, the exposed film is developed and interpreted.

Isotope radiography has proven safe, reliable, and versatile. Inspection of complicated machinery can be made without dismantling. Radiation sources can be of any desired shape or size, and they offer high radioactivity at relatively low cost.

One U. S. supplier of isotope equipment now has completely portable radiography equipment on the market. Prices range from $1,600 to $15,000 for the equipment. The isotope used may cost another $200 to $500: U. S. firms distributing cobalt-60 get $50 per curie for the first two curies, $2 per curie for each additional curie, plus the cost of encapsulating the isotope in a safe container.

III. As a Catalyst

There is great promise for isotopes as active agents or chemical catalysts, in a thousand and one uses now edging from research into industry. Rays kill, and because they kill, they can preserve food (MD, Mar., p 49) and sterilize medicines and hospital supplies. They also alter the structure of chemical elements, and they may play an important role in the development of new and better plastics.

Scientists see a new branch of the chemical industry growing up based on the use of radiation. Not only does radiation make some unique changes in matter; but, where it parallels conventional chemical techniques, it does its work under a wide range of temperatures. Radiation can effect chemical changes in solids as well as liquids and gases. This can mean the synthesis of a material chemically, then the transformation of the final product—with the addition of new physical properties—by subjecting it to radioactive isotopes.

Radioisotope batteries also appear to be on the horizon. A U. S. research organization recently developed a wrist watch powered by a tiny battery using the isotope promethium-147. The battery has an output of 20 microwatts and a useful life of more than five years.

The battery converts atomic radiation into electric energy. Though the energy output is small, the batteries have wide applications. Larger models of the future are expected to power portable radios, hearing aids, guided missiles, and space craft.

The vast quantities of isotopes that will be available from reactors in the next five or ten years will broaden all these applications. Radiography and detecting instruments will continue to demand larger quantities, but an even greater share will go into new processing uses: food processing, sterilization of materials, vulcanization of rubber, improvement of plastics. ●

Words of the New Science

Accelerator—A machine using electric or magnetic forces for imparting very high speeds to particles of atoms. Examples are the linear accelerator, the cyclotron, and the betatron.

Cobalt-60 — A radioactive isotope with a half-life of 5.27 years widely used in industry and research.

Curie—A measure of the rate at which a radioactive material throws off rays or particles. The radioactivity of one gram of radium is one curie.

Gamma rays—Similar to X-rays, the most penetrating radiations from isotopes. Other emissions are alpha and beta particles.

Half-life—The time taken for a radioactive substance to decay to half its original value.

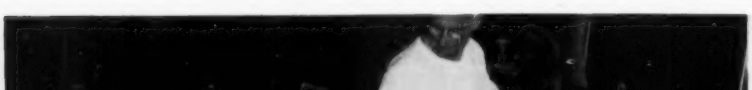
Isotopes — Atoms of the same element which are identical in their chemical behavior but have different atomic weights. In common usage, isotopes that are radioactive.

Neutron — A neutral particle found in the nucleus of the atom which plays a vital role in splitting the atom.

Radioisotope — A radioactive isotope of an element.

Reactor — An atomic furnace, where the nuclei of uranium are split by bombardment of neutrons.

Tracer — A radioisotope mixed with a stable material, and used to trace material as it undergoes chemical and physical changes.

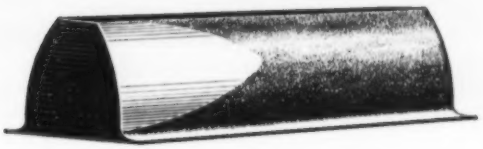


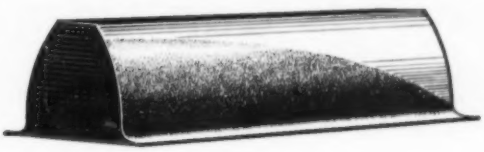
Hard Gear Honing

GIVES YOU BETTER GEARS AT LESS COST

QUICK GEAR INSPECTION

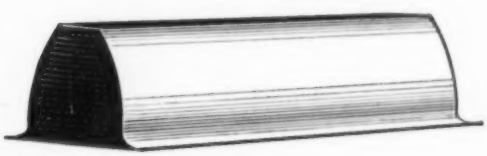
One quick pass with a Red Ring honing tool cleans up the teeth or immediately reveals heat-treat distortions, thus indicating corrective adjustments in the gear forming processes.





CORRECTION OF HEAT-TREAT DISTORTIONS

Minor distortions in tooth profile, helix, index and runout are corrected in from 15 to 60 seconds of honing time.



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Gear honing provides:

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For Quality Gear Production, write for Bulletin H57-2 which gives the full story on Red Ring Hard Gear Honing.

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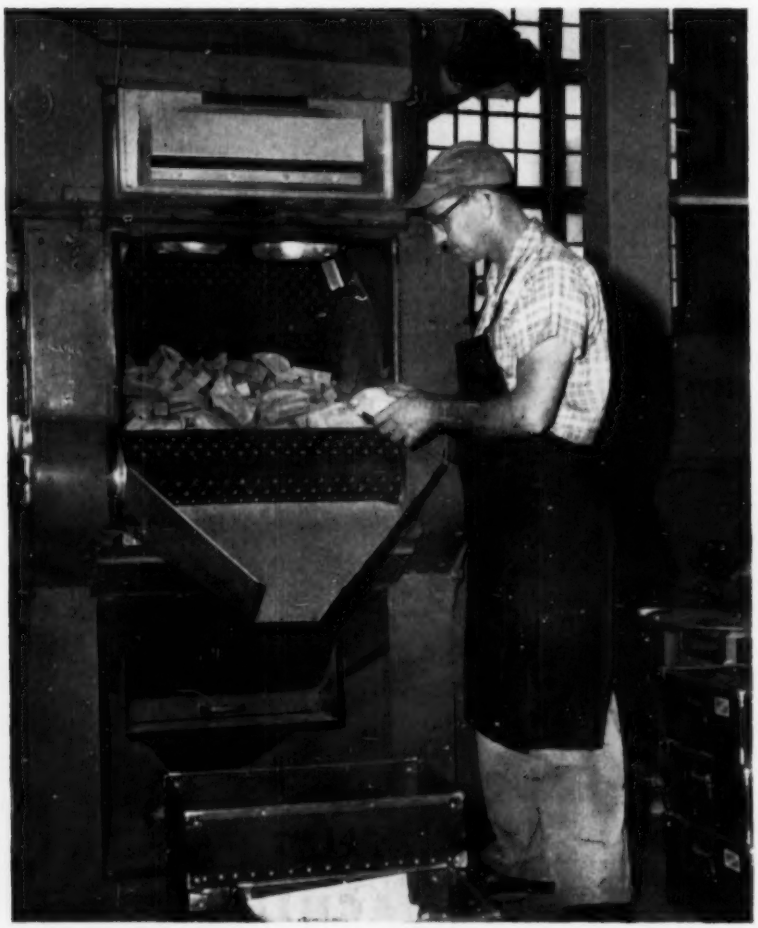
FEED TRUCK with two trays and a chute illustrates a reliable route to economy: Keep your pick-up and lay-down operations close together. Man takes parts from top tray, machines them, drops them via chute into bottom tray.

VIBRATING SCREEN—in place of manual checking—saves time and provides better inspection. Dumped into hopper, parts fall

Savings Can Come from Any Corner of

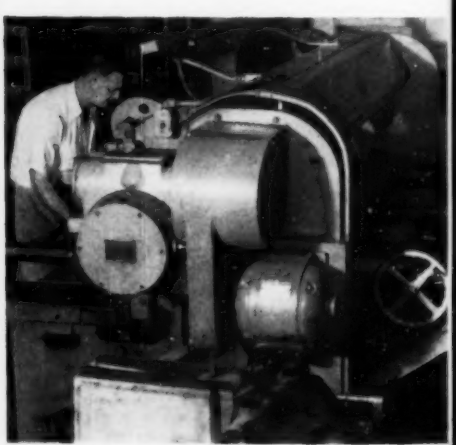
To find new ways of reducing costs, one company has been probing into every phase of its manufacturing operations.



DEBURRING MACHINE for fiber and plastic parts cost $7500, but it will pay for itself in a year. A boxful of parts lose their inside and outside burrs by being grit-blasted for 10 to 20 minutes. Manual deburring was messy, tedious.

MONEY-SAVING ideas can come from anywhere. A frequent source are the suggestions of workers (page 26). Another approach is a militant search by management for new ways to speed work, reduce lost motion, eliminate waste, simplify production flow.

National Vulcanized Fiber Co., an American firm manufacturing a wide variety of plastic and fiber products, used both approaches in a four-year program that is now paying off in a big way. Some of the innovations produced by National's organized attack on costs are pictured on these two pages. And National's executives believe



SHEER OPERATOR formerly had to run to back of machine periodically to sort and pile strips as they were cut from sheets.

Planning Cuts Repair Bills

onto screen; vibration sifts scrap through screen, separates parts and passes them to belt, where operator removes the rejects.

HANDLING SYSTEM for punchpress involves four items: special pallets, double-faced pallet racks, a lift truck, several floor trucks. Operator lifts pallet from rack to floor truck with lift truck, moves to press, feeds off floor truck.

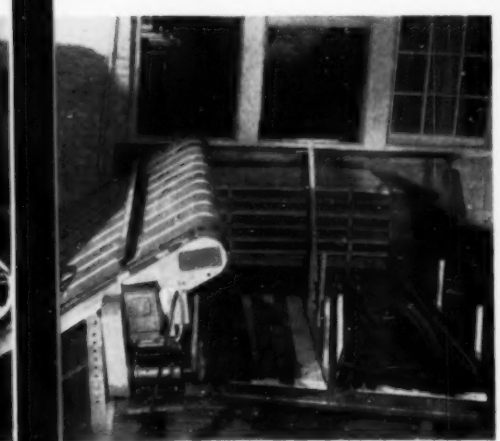
Your Factory

that similar innovations are possible in any factory in the world—if management takes the time to look for them.

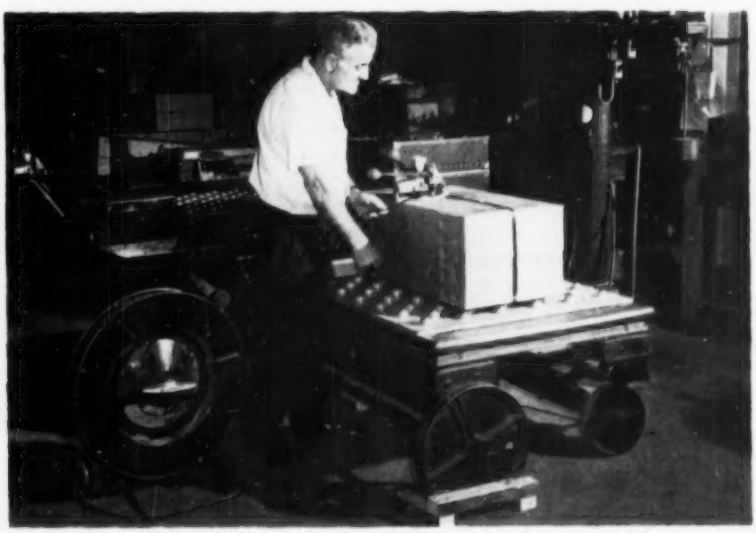
National's engineers went from one to another of the firm's several plants—looking for inefficiency, work delays, output bottlenecks. They studied operator performance, output capacity, product quality, and indirect labor costs.

Three main avenues to reduced cost became evident during the program: 1) improved equipment and methods; 2) better raw materials; 3) careful measurement of work output. (*Factory Management & Maintenance, Feb., p84*)

NEW PART BOXES can be stacked; take up less space, offer easier identification than the tall cans formerly used. Boxes are marked with colors for tare weight. Metal rims permit attachment of routing and part-count tickets.



A "stripveyor" now catches strips as they drop from sheer, carries them upward, and drops them into piles. Output is up 50%.



BALL BEARINGS serve a novel purpose set on this tabletop mounted on a platform scale. Steel straps for binding cartons slip easily between rows of bearings. No turning or revolving of carton is required. Table's cost: $158.

Planning Cuts Repair Bills

A large chemical firm found that a 10-man crew . . .

under ordinary conditions
did a maintenance job in..... 10 hours

But with trained planners
. . . after one month
completed the job in..... 9 hours

. . . after 6-8 months
completed the job in..... 6¼ hours

. . . after 18-24 months
completed the job in..... 5 hours

MAINTENANCE JOBS can be a deathly drain on a company's profits. The answer is in pre-planning of these jobs.

Planned maintenance is no more than applied common sense. It means maximum utilization of labor and materials—men do not work harder or faster, but they accomplish more. The key to the program lies in providing the maintenance worker with a step-by-step analysis of the work to be done, a list of materials and tools needed, and advice on safety precautions that must be observed.

How an effective program works will be described in detail at the maintenance conference of Canadian Industries Ltd. in Toronto later this month. This large Canadian chemical firm began its program three and a half years ago, and it now has been adopted by several of CIL's 19 plants. The firm's remaining plants are giving it serious study.

"Planning," says a CIL maintenance specialist, "involves advising all concerned of what we wish to achieve, how the job is to be done, how long it should take to do it, and making sure that all job obstacles and interruptions are avoided."

The company sets up standards for gaging how fast maintenance should be completed. All operations of a large number of maintenance jobs at a plant are carefully time-checked over a period of a year. The actual time it takes to do a job is compared with the estimated time computed from time data of the component parts of the job.

A program at a given plant begins with the selection and training of a maintenance planner. CIL found that it could not spare foremen for this work, nor did they make the best analysts or planners. A foreman, it was decided, should be kept to his basic functions—crew leadership, work evaluation, instruction of workers.

The chemical firm selected a workman from each of the trade groups, and trained him as a maintenance planner. The training courses at first ran about eight weeks. As a system was developed, the course was shortened.

The planner acts as an advisor to the foreman. He collects facts, outlines four or five suggested jobs, then discusses them with the foreman. Often he will suggest methods that will reduce the man-hours required for a job.

The initial task of the planner is to question the need of doing any given job. His knowledge of coming events—production schedules and allied repair jobs—puts him in a position to recommend postponement and cancellation of jobs. Often he will arrange for two or three maintenance jobs to be done in combination.

He meets with production foremen and operators to find out why and how the equipment stopped. Working in concert with the maintenance foreman, he determines what is to be done and how many men will be required. He also finds out whether emergency action is needed.

The planner finally prepares a summary sheet, detailing all facts required for a given job. This will list materials and equipment, describe phases of a job, and include safety precautions for workmen. Sketches and photographs often will be included.

After management has given its approval, the foreman and his crew go to work. When the job is finished, the planner notes on his summary sheet any changes between the work projected and the work done.

In its planned maintenance program, CIL hopes to be able to budget its plant repairs and upkeep. Where the system has been installed, a guide is available for predicting and controlling maintenance costs. Experience has shown that costs can be reduced by a third in six or eight months (see chart above) and cut in half by the end of two years.

The program also is good for employee morale. When a man goes out to do a job, he knows exactly what he is supposed to do —and he has the information, supplies, and tools that are required for doing the job. (*Digested from Chemical Week, Feb.* 15, *p*51) ●

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PAN AMERICAN

LEADER IN OVERSEAS AIR CARGO

Natural Gas May Go By Ship

The waste gas from Venezuelan and Mid-East oil fields soon may burn in British homes and factories.

PROBLEM: How to get low-priced fuel—natural gas—to industrial areas where it can be used. Venezuelan and Middle East oil fields offer an abundant supply of gas. The factories of Britain, West Europe, and Japan can use this fuel if it can be brought to their shores economically.

Several schemes have been advanced to solve this problem. France for some time has been studying a plan to pipe natural gas across the Mediterranean from the Algerian Sahara to southwest France. Technical problems involved in crossing the sea have not been resolved. An alternative plan is to use the gas to make electricity, then send the power.

An underseas line also has been studied for carrying Mexican gas to Cuba. The line would run onshore south to Campeche, then cross the Gulf of Mexico to Cuba. Indications are that the plan would be too costly for the Cuban market.

More promising today are plans to liquefy gas and transport it by ship to industrial areas. Japan hopes to get cheap fuel from Arabian fields by this method (MD, Dec. '58, p 52), and Britain later this year will receive a test cargo of liquefied gas from the U. S. A. This last venture comes out of an agreement between the British Gas Council and Constock Liquid Methane Corp., an American firm formed for the experiment by Continental Oil Co. and the Chicago Stockyards Co.

Constock will liquefy the gas at a plant on the U. S. Gulf Coast, and pump it into a converted cargo vessel. The ship is being equipped with heavy insulation and special machinery at a cost of $4-million. In England, another million is being spent on a terminal where the liquid will be revaporized.

Liquefying natural gas, or methane, has required the solution of some tough technical problems. The gas has to be lowered to a temperature of −150 C, far lower than is required for manufactured propane and butane, which are commonly used where no natural gas is available. Methane must be kept at this low temperature if it is to remain liquefied.

When liquefied, methane contracts in the ratio of 600 to 1: 100 cubic meters of natural gas yielding about a barrel of liquid. This is one reason why the planned program appears promising. Another is that natural gas has about twice the heating capacity of the manufactured gas now used in Britain.

Though test shipments will be made with American natural gas, the U. S. is not considered the most likely source of permanent supply. Less expensive Venezuelan and Middle East gas can be made available. This could be liquefied and delivered to Britain and Western Europe at a lower price than they now pay for manufactured gas.

The test ship will carry only 35,000 barrels of liquid methane, which is not much by commercial standards. But if trial runs prove successful, Constock plans to build large tankers for this service. The firm also will build liquefying plants in areas with abundant supplies of natural gas.

Constock officials expect that part of the methane will vaporize during its trip across the seas. They hope that specially designed tankers of the future can use the vaporized gas as a fuel. ●

Nitrogen Freezing Speeds Up Grinding and Machining Jobs

Digested from BUSINESS, Feb., p76

Grinding or machining always involves a rise in temperature. Many materials can not stand the intense heat, and the result often is interruptions in processing, damage to product quality, costly finishing operations.

"Deep-freezing" the article may be the answer. Methods of doing this have been under study in Britain, Germany, and the U. S. A. for several years. Until recently, liquid oxygen and solid carbon dioxide were the coolants used. Now a new technique using liquid nitrogen has been advanced, and it opens up a wide range of profitable commercial uses.

Nitrogen gets special consideration because it is inert, safe to handle, and (unlike carbon dioxide) will not react with moisture to produce acidity that might harm a product. It is more effective than solid CO_2 because, as a liquid, it comes in closer contact with a material to be cooled.

Nitrogen boils at −195.8 C, lower than liquid oxygen (−183 C) and very much lower than CO_2 (−78.5 C). This means that substances become more brittle with nitrogen freezing, and stay colder longer than with other coolants.

Though freeze-grinding with nitrogen still is new, tests have shown that it has wide commercial possibilities for everything from foods to plastics. Explosive materials have been ground, and the inert nitrogen has acted as an excellent fire extinguisher.

In a recent trial operation, lard was frozen with nitrogen and then ground into a fine powder. When mixed with flour, the particles remained isolated and made a far smoother cake-mix.

Paints today are being improved with plastic additives. But the plastics must be ground very finely. Only freeze-grinding can powder certain plastics to the required quality.

Quick-freezing also can hold the aroma in coffee, prevent loss of vitamins and flavor in other foods, and aid in machining rubber parts (MD, Feb., p 45). In a test operation, rubber rollers were

dipped in liquid nitrogen and then machined on a lathe. The rubber remained cold enough for precision machining for two minutes.

The disadvantage of liquid nitrogen is that it is expensive. Handling costs are high, and losses are incurred in storage, filling and emptying containers. The process is economic only when the basic costs of the material being ground are relatively high. ●

Tool Burns Through Concrete

BREAKING THROUGH heavy concrete always is a troublesome task, both in demolition and remodelling jobs. When breakthroughs have to be made in existing masonry without damaging other parts of the structure, the job becomes more complicated. Blasting is treacherous, and mechanical demolition very costly.

An answer to the problem is in the precision powder-cutting process recently developed by Linde Co., a division of the U. S. A.'s Union Carbide Corp. The process of the U. S. firm feeds a mixture of iron and aluminum powder into a hot oxygen-acetylene flame. The rapidly burning powder boosts the flame's temperature, and melts away the concrete.

Besides being fast and accurate, the cutting operation is vibration-free and can follow any straight or curved line. The equipment is relatively lightweight, inexpensive, and compact. Anyone who can use an oxygen-cutting blowpipe can learn to handle the new tool.

Use of the new cutting tool demands certain precautions. The action of the tool produces hot slag that can create a fire hazard if not protected. Also, smoke is created by the oxidation of iron. Though the smoke is non-toxic, a ventilation system is recommended when the work is done in an enclosed area.

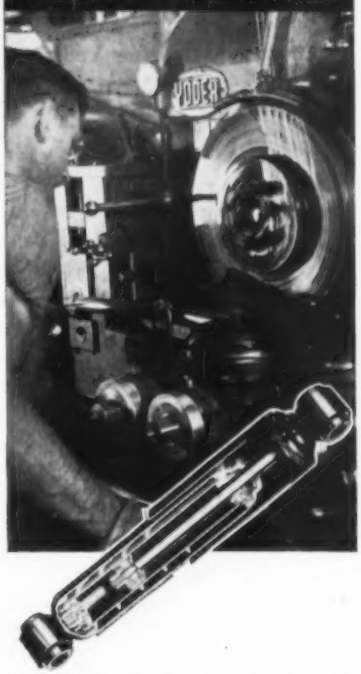
A blow pipe (shown in photo below) is used to cut through concrete up to 45 centimeters thick. For cutting slabs thicker than 45 centimeters, a manually operated powder lance is used.

Cutting speeds range from 2½ to 6 centimeters per minute, irrespective of the thickness of the concrete. To compensate for heavier slabs, the volume of gas and powder are increased.

Steel reinforcements in the concrete contribute to the cutting speed of the process. This is because the burning of the metal adds to the intensity of the cutting flame. (*Factory Management & Maintenance, Feb., p* 116) ●

CONCRETE melts away under heat of burning iron and aluminum powder.

Monroe Shock Absorbers rely on Precision Performance of YODER TUBE MILLS



After 15 years of continuous operation the Yoder Type-M Electric-Resistance Weld Tube Mill shown here, is still producing precision tubing for the Monroe Auto Equipment Co., Monroe, Michigan.

Yoder produced tubing is the basic component of the famous "Monro-Matic" shock absorber. Measuring 2 1/64" outside diameter (plus several other sizes) the tubing is made from 22 gauge strip in one continuous operation . . . it is automatically cold-roll formed, welded and cut to pre-determined lengths.

This typical installation of a Yoder tube mill exemplifies the accuracy, dependability and production economies of Yoder-made tubing. If your business requires pipe or tubing, ferrous or non-ferrous, in sizes from ¼" to 26" diameters, there is a Yoder mill designed to produce it economically, efficiently and accurately.

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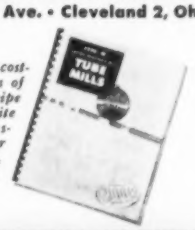
Check into the many cost-saving advantages of operating a Yoder pipe or tube mill . . . write for the fully-illustrated 88-page Yoder Tube Mill Book . . . it is yours for the asking.



ENGINEERING YODER MANUFACTURING
PIPE AND TUBE MILLS
(ferrous or non-ferrous)

● YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write on your company letterhead directly to the address given, mentioning Management Digest.

"Planning Ahead for Profits"—The executives of several leading American manufacturers discuss the basic elements of long-range product planning and development. $4.50. (American Management Association, 1515 Broadway, New York 36, N. Y.)

Work Measurement—"Basic Motion Timestudy" is a practical manual that combines the theory of motion identification and timing with a workable method of applying time data to manual activities. 224 pages, $5.00. (McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y.)

Photography/Radiography—"Photography Through the Microscope" provides an excellent introduction to the latest techniques of ultra-violet and infrared photomicrography, cinephotomicrography, and phase and electron microscopy. $0.75. . . . Information on the characteristics of Kodak films, radioactive isotopes and their application, and a guide for selecting films for X-ray and gamma-ray radiography is given in "Radiography in Industry." 136 pages, $5.00. (Eastman Kodak Company, Rochester 4, N. Y.)

Political Handbook, 1958—Complete information on the structure and composition of all governments. Special sections on the United Nations and other international bodies are included. $3.95. (Council on Foreign Relations, 58 East 68th Street, New York 21, N. Y.)

Bulletins From Industry—Information on lift truck construction, operation and maintenance, plus helpful data on handling and stacking techniques is given in a new Operator's Guide. (Towmotor Corp., 1226 E. 152nd St., Cleveland, Ohio) . . . Booklet BSD-47 will tell you how effective materials management can reduce inventory investment, carrying costs, space requirements, production delays, and unit cost through volume purchases. (Remington Rand International, 315 Fourth Avenue, New York 10, N. Y.) . . . Booklet 500 (available in English and Spanish) lists typical applications of 'dag' colloidal dispersions, as maintenance and operating lubricants, in manufactured products, and as product lubricants. (Acheson Intl. Sales Co., Port Huron, Michigan.)

Employee Turnover—If you are concerned with employee turnover, a handy checklist of 100 suggestions for hiring and holding personnel will prove helpful. (Manpower, Inc., 820 N. Plankinton Avenue, Milwaukee, Wisconsin.)

Training Workers—"Industrial Training"—the first of a series—provides a brief introduction to the subject, its scope and general principles. The reasons for training, training techniques, and the use of visual aids are discussed. 4s. 6d. or $0.63. (The Institute of Personnel Management, Management House, 8 Hill Street, London W. 1, England.)

▶ YOU AND YOUR PERSONAL AFFAIRS

BRIDGE, ANYONE?

Bridge is an increasingly popular card game around the world. It is well suited for small social evenings at home, and almost perfect for leisurely ocean crossings and the like (perhaps you have seen three players searching frantically for a "fourth for bridge").

It is a lively game that stimulates conversation (too much, in fact, dedicated players complain) and controversy (friendships are sometimes momentarily shattered, but the damage is seldom permanent). Played at its best, it taps a high order of analytic ability.

The object of bridge, in brief, is for each side to determine—through probing "bids"—their combined strength in cards. The high and final bid becomes a contract (in Hearts, Spades, etc.). Then the cards are played, and the goal is to win enough plays to meet the contract. The scoring includes various kinds of penalties and bonuses.

To play bridge, you must learn a system of signals that enable you to communicate with your partner. Among "social" players, the most popular system today is the "point-count" system popularized by Charles H. Goren. "Goren" is considered more precise and subtle than the once-popular Culbertson system. Both, however, are relatively simple and suited to the average player. For experts, there are a variety of more complicated systems.

Goren's New Contract Bridge Complete (Doubleday & Company, Garden City, New York, U.S.A., $4.95) has just been published, and is being translated into French, Swedish, Dutch, Danish, Spanish, German, and Italian. Users of Goren will note a few revised recommendations.

As you learn a system, remember that the superior player knows when to break the rules. Sometimes you may even have to mislead your partner to avoid an awkward position. In such a case, Goren—with tongue in cheek—suggests this procedure: "If you have a partner who is a stickler for technicalities, do not admit that you rebid the four-card suit. Slyly place a little Heart among your Diamonds and blame it on the bad lighting."

In playing, you will soon learn techniques such as the finesse, cross trumping, "echoing," the double squeeze, and the "Vienna coup."

And if you should develop a real genius for the game, there is a world-wide tournament network that awards "masters points": As in chess, the ultimate achievement is to become an International Grand Master. At the summit is the World Team championship—this year won by Italy.

THE BEST OF TWO WORLDS

If you—or perhaps a friend—are approaching retirement age, you may welcome the prospect of more leisure but dread the feeling of not being occupied. "Retirement? It would be slow death," is a common belief.

Retired U.S. executives have found a way of combining both worlds—through consulting service. Management consulting groups built around retired executives are springing up in a number of American cities.

Some groups offer free services; others expect the client to cover expenses; and others are frankly out to make a profit. But all have the same twofold aim: (1) to meet the need of small business for expert help, and (2) to keep experienced and still useful executives busy at the job they know best—helping to run a business.

Publications Digested

American Automobile
American Letter
American Machinist
Aviation Week
Business Education World
Business Week
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Control Engineering
El Automovil Americano
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Ingenieria Internacional Construccion
Ingenieria Internacional Industria
Metalworking Production (London)
National
Nucleonics
Petroleum News
Petroleum Week
Power
Product Engineering
Purchasing Week
Textile World
Today's Secretary

McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.

American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications
Simmons-Boardman Publishing Corp., 30 Church St., New York 17, N. Y.

American Business
Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Ill.

Architectural Record
F. W. Dodge Corp., 191 W. 40th St., New York 18, N. Y.

Banking
American Bankers Association, 12 E. 36th St., New York 16, N. Y.

Business
Business Publications Ltd., Mercury House, 109-119 Waterloo Road, London, S. E. 1.

Ceramic Industry
Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.

The Controller
Controllers Institute of America, Inc., Two Park Ave., New York 16, N. Y.

The Economist
The Economist Newspaper, Ltd., 22 Ryder St., London, S. W. 1.

Harvard Business Review
Harvard University, Soldiers Field, Boston 63, Mass.

Heating, Piping & Air Conditioning
Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.

Industrial Marketing
Advertising Publications, Inc., 200 E. Illinois St., Chicago 1, Ill.

The Management Review, Personnel, Supervisory Management
American Management Association, 1515 Broadway, New York 36, N. Y.

Metal Progress
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Modern Packaging, Modern Plastics
Breskin Publications, 575 Madison Ave., New York 22, N. Y.

The Paper Industry
Fritz Publications, Inc., 431 S. Dearborn St., Chicago 5, Ill.

Petroleum Press Service
Petroleum Press Service, 91 & 93 Bishopsgate, London, E. C. 2

Plastics, The British Motor Ship
Temple Press, Ltd., Bowling Green Lane, London, E. C. 1

Printers' Ink
Printers' Ink Publishing Co., Inc., 205 E. 42nd St., New York 17, N. Y.

Rubber and Plastic Age
Rubber and Technical Press, Ltd., Gaywood House, Great Peter St., London, S. W. 1

Sales Management
Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.

The Times Review of Industry
The Times Publishing Co., Ltd., Printing House Square, London, E. C. 4

Welding Engineer
Welding Engineer Publications, Inc., P. O. Box 28, Morton Grove, Ill.

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Complete information on Dowpon—the systemic grass killer—is available through your local Dow representative, or contact the Dow branch office in your area.

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Ford tractors produced in Highland Park, Michigan, make farming more productive and more profitable all over the world. The Model 960 Powermasters, shown here awaiting shipment, are equipped with power steering. To help provide trouble-free performance for the life of these tractors, Ford Motor Company uses strong, job-proved tubing, such as Bundyweld, for vital fuel, oil and hydraulic lines.

Why these steel-sinewed workhorses rely on lifelines of Bundy Tubing

THESE TRACTORS are man-made workhorses with sinews of steel . . . and perform farm chores that would take hundreds of Nature's horses to handle. But sheer strength isn't enough. To give its tractors solid dependability as well, Ford Motor Company, like so many other leading manufacturers, uses lifelines of Bundyweld® Tubing that meet Ford's exacting specifications.

Bundyweld is better tubing because it's *made* better by the exclusive process shown below. *Leakproof by test*, it has become the safety standard of the automotive industry. *Bundyweld is used for fuel, oil and hydraulic lines on 95% of U.S.-made cars, in an average of 20 applications each.*

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continuously rolled twice around laterally into a tube of uniform thickness,

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DOUBLE-WALLED FROM A SINGLE STRIP

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Ductile
Lightweight
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Takes plastic coating
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Shock-resistant
No inside bead
Uniform I.D., O.D.